SEPTEMBER 24, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

A PROGRAM FOR MANAGEMENT IN 1956 . . No. 8

Motivating Men To Produce More

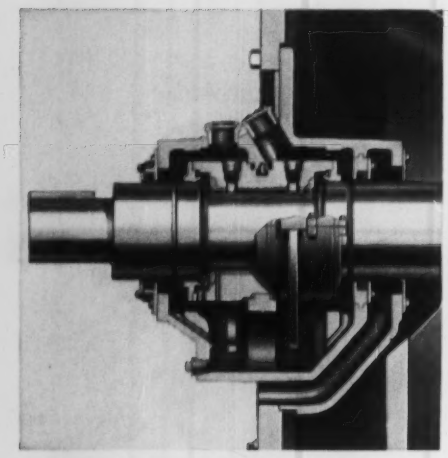
Lincoln Electric Co.'s J. F. Lincoln (left) and others tell of their techniques and experiences in winning greater productivity . . . page 105

- Guide to Hot Work Tooling . . . page 116
- Steel Distribution Patterns Shift . . . page 149

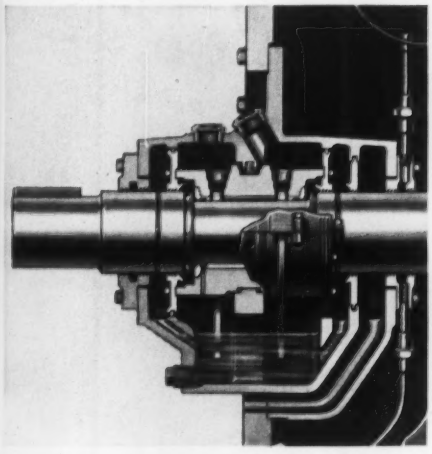
CONTENTS — PAGE 5

NEW Bearing Design Means Better Motor Performance

Allis-Chalmers capsule-type sleeve bearings now perfected for complete motor line



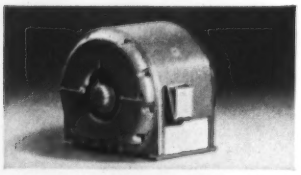
Standard capsule-type sleeve bearing



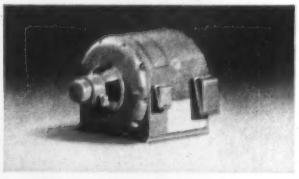
High speed capsule-type sleeve bearing

A new feature—an improved capsule-type bearing design—has been added to the Allis-Chalmers complete line of large end-shield bearing motors. This new bearing will give you better motor service, simplified maintenance and longer motor life through features like:

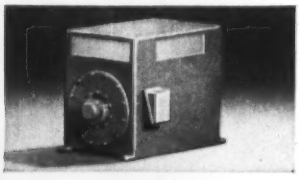
- Dust-tight, leakproof enclosure protects bearing from dirt, dust or abrasive materials.
- Venting system prevents oil leakage — keeps oil and vapor from getting into motor enclosure.
- Dual oil-rings insure bearing surface lubrication — either ring can adequately lubricate bearing.
- Split end-shield gives easy accessibility to winding and air gap — without disturbing capsule or bearing alignment.



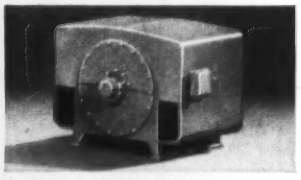
Drip-proof or splash-proof cage motor



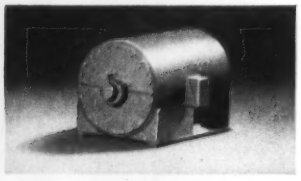
Synchronous or wound-rotor motor



High speed cage motor

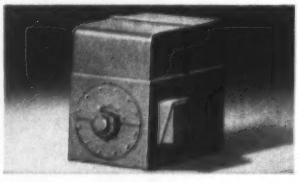


Weather-protected motor



Totally-enclosed fan-cooled motor

Totally-enclosed forced-ventilated motor



Water-cooled or inert-gas-filled motor

Capsule-type bearings are standard on these Allis-Chalmers motors.

You get MORE from Allis-Chalmers motors

More design and construction features — more application help. For complete information, contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5032

Truckload of bricks bundled in lots of 100 with strapping made by Signode Steel Strapping Co., Chicago, Ill.

Look what's happened to the hod-carrier!

A few cents' worth of steel strapping enables this fellow to wheel 100 bricks at a time around the job-site, where his predecessor carried only ten!

Yes, they work a lot of magic these days with that familiar packaging standby, steel strapping. Cargo handlers secure lading with it, warehousers bind pallet-ends with it, builders tie up forms for concrete columns with it. There appears no limit to the promotional imagination of steel strapping manufacturers.

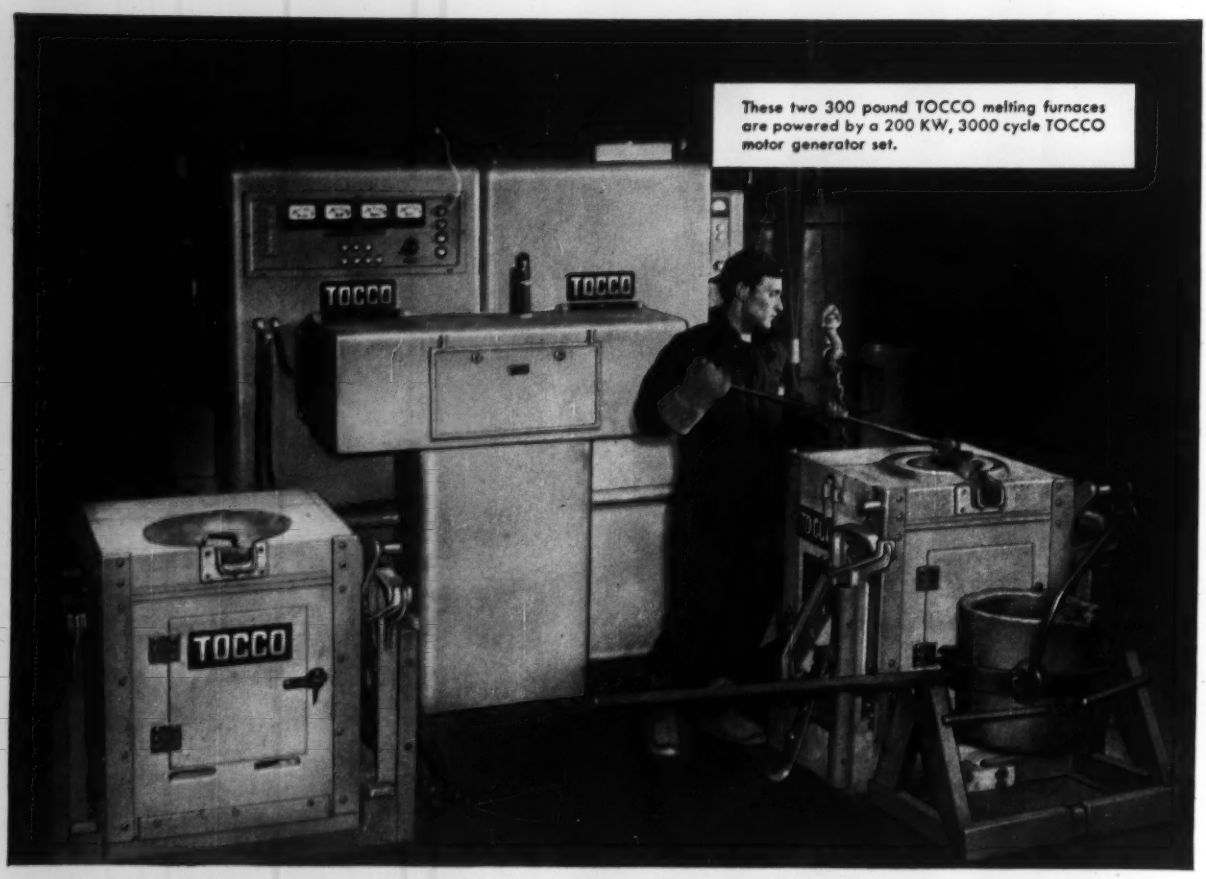
The raw material for most steel strapping is hot-rolled coiled sheets. Steel-strapping manufacturers look to Bethlehem for a healthy mileage of this raw material. Strapping is one of the many uses of sheet steel which have grown into important consumers of Bethlehem sheets during recent years. Combine the many relatively new and fast-growing sheet uses with the longer-established ones, and you can understand why Bethlehem is being called on to turn out steel sheets in larger volume than ever before. We are making every effort to overtake the unprecedented demand.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM SHEETS

BETHLEHEM STEEL



These two 300 pound TOCCO melting furnaces are powered by a 200 KW, 3000 cycle TOCCO motor generator set.

TOCCO* Induction Melting "Delivers"— In Two Days Instead of Two Months!

Casting backlogs at Commercial Shearing and Stamping Co. in Youngstown, Ohio used to lag from 8 to 10 weeks behind production schedules. By installing four 300 pound TOCCO melting furnaces this firm upped daily melting capacity to 16,000 pounds. Now orders can be shipped in 48 to 72 hours.

In a foundry occupying less than 5000 square feet of space, production of castings jumped between 40% and 50%; tensile strength of alloy castings was boosted from 35,000 to 50,000 p.s.i. Substantial savings in the cost of castings have resulted. Moreover, with precision casting and molding on a push-button basis, many former drilling and roughing operations were completely eliminated.

Many firms have discovered that TOCCO Induction Melting insures maximum quality control, increased volume and lower operating costs—foundry premiums directly linked to TOCCO's rapid melting, simplicity of operation, low alloy loss, constant burn off and pinpoint quality control.

THE OHIO CRANKSHAFT COMPANY

TOCCO

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-9, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting."

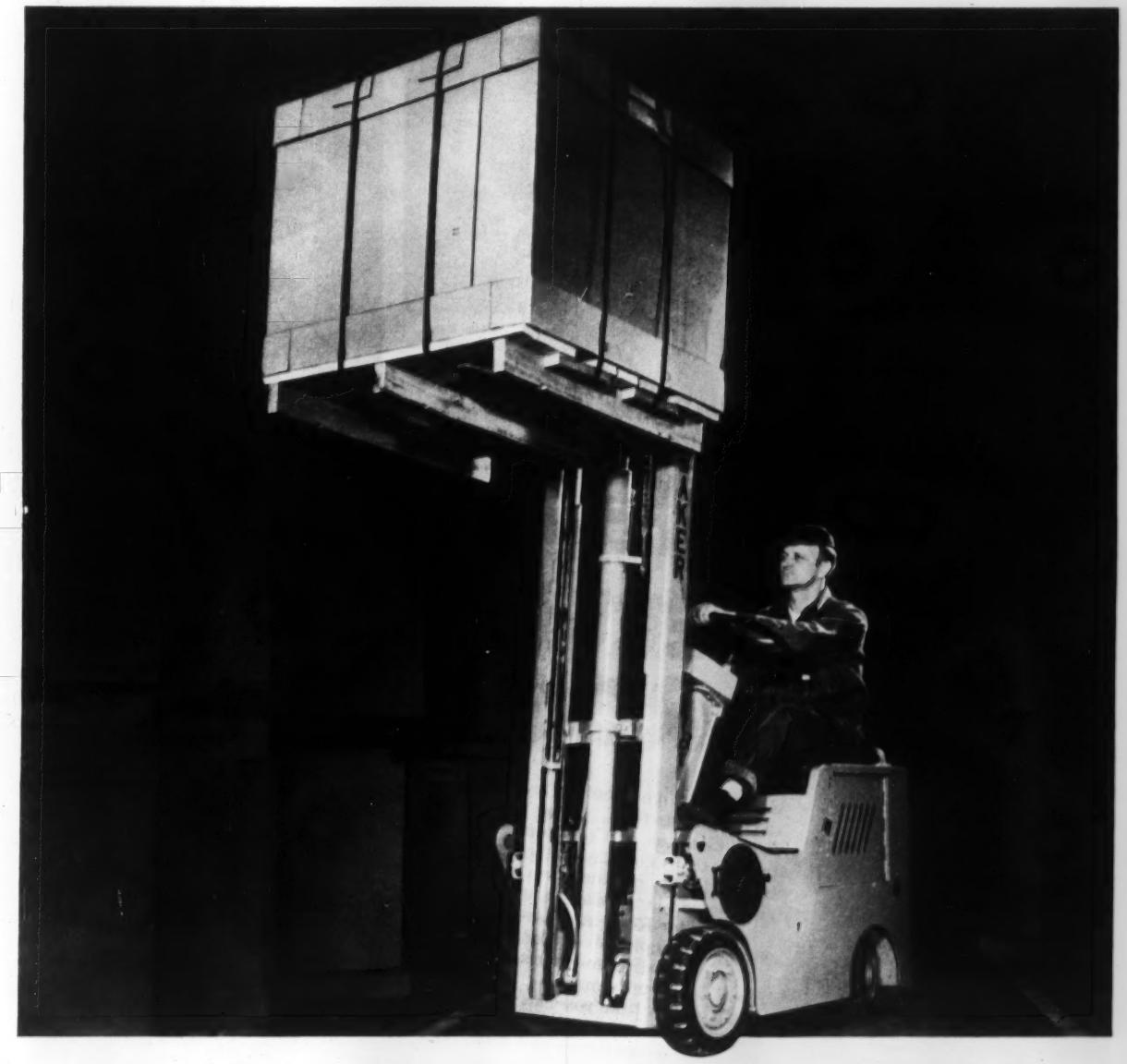
Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State____



Now Baker gives you Balanced Design in an all new 2000 lb. gas fork truck

This newest addition to Baker's outstanding line of gas-powered fork trucks now completes the range of models from 2000 to 7000 lbs. Like its companions it features Baker *Balanced Design*, with all elements coordinated to work together for top efficiency, maximum dependability and longest life.

For greatest operator convenience and safety it features absence of cowl and offset driver position for better visibility . . . recessed seat for lower driver silhouette . . . unobstructed access for mounting from either side . . . effortless automotive steer . . . self-adjusting, self-energizing and self-equalizing hydraulic brakes.

Actual turning radius of this sturdy compact truck is only 61½ inches . . . it operates in 57-inch intersecting aisles. Total lift 130 inches . . . lifting speed 45 FPM, lowering 65 FPM . . . travel speed 8 MPH forward, 7 MPH reverse —all with full load. Mast tilts 10° forward or back.

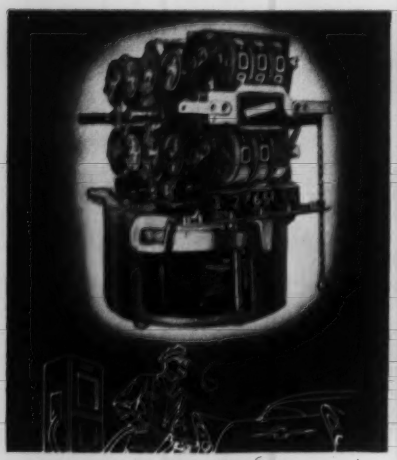
Baker
handling equipment

THE BAKER-RAULANG COMPANY

1259 WEST 80th STREET • CLEVELAND 2, OHIO

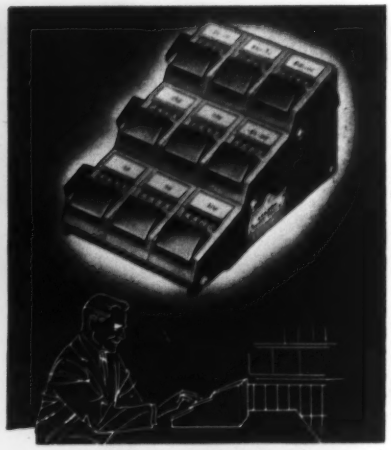
A subsidiary of Otis Elevator Company

6G3



Computing Head for Gasoline Pumps

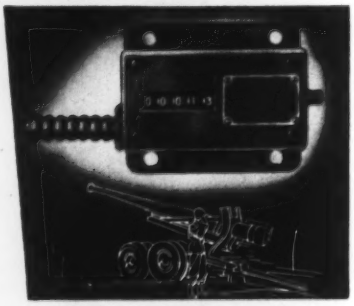
"Master Meter Duplicator" prints receipts for fuel oil delivered from trucks



"Vary-Tally" Multi-Unit Reset Manual Counter

Everyone Can Count on VEEDER-ROOT

Rev-Counter for all types of engines



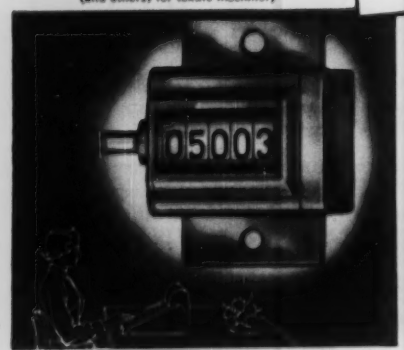
Recoil Counter for new 280 mm atomic cannon

2-3-4 Convertible Counters (and others) for textile machinery

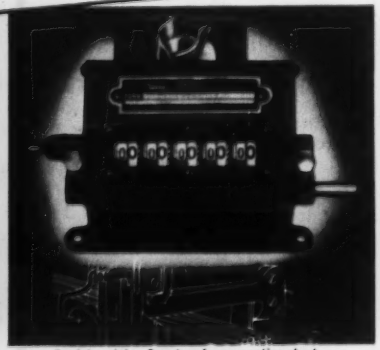
Everywhere you look in everyday life, you see a familiar face . . . the face of a Veeder-Root Counter or Computer. From gasoline pumps to fuel oil trucks to textile mills . . . in the home, on the farm, in business and commerce, in modern automated industry . . . Veeder-Root standard and special devices are keeping everything under *Count*rol . . . manually, mechanically, electrically. And the mathematical probabilities are mighty high that *you* can count on Veeder-Root, too . . . to your advantage and profit. Why not let us figure out how, *right now*?

VEEDER-ROOT INC. • HARTFORD 2, CONN.

Fuel-Remaining Counter for aircraft . . . subtracts as fuel is used



Small Square-Case Counters for office and other machines



Predetermining Counters for preventing short and over-runs on production machines

Range Timer . . . easy to read . . . easy to set

STOCKS OF STANDARD COUNTERS AVAILABLE AT — Greenville, S. C. • Chicago 6, Ill. • New York 19, N. Y. • Los Angeles • San Francisco Montreal 2, Canada • Offices and Agents in Other Principal Cities

In This Issue

STEEL
The Metalworking Weekly

September 24, 1956 Vol. 139 No. 13

☑ 59 **Metalworking Outlook**—Material Handling in the Steel Industry

☑ 63 **Editorial**—Get Out the Vote!

65 Packaging Industry Outlook: Metalworking's Interest Broadens
67 More Metals Development Ahead as Stainless Get Its Wings
68 Steel Labor Union Has Quiet Session
69 Ingalls Iron Works Co.: From Buildings to Ships
70 Expanded Roles Mapped for Personnel Directors
71 Brush Beryllium Corp. Enters Atomic Business

☑ 72 **Windows of Washington**—Transport Baedeker Urged

75 Management at Work—Square D's Patterson
76 Specials Get Top Billing in Machine Tools' New Look

☑ 79 **Mirrors of Motordom**—Fourth Quarter Sales Look Good

☑ 83 **The Business Trend**—Biggest Quarter Just Around Corner

87 Men of Industry—News About Men You Know
93 Union Carbide Dedicates New Parma, O., Laboratory

☑ 115 **Technical Outlook**—Hot Alloys

116 Guide to Hot Work Tool Steels
120 Sample Your Incoming Quality to Keep Costs Down
122 Welding Aluminum to Copper

☑ 124 **Progress in Steelmaking**—Mold Deoxidation

128 Overhead Crane Goes Hydraulic
129 Machine Topics—Coolants for Automation
130 Induction Stirrers Upgrade Cast Steel
135 New Products and Equipment
144 New Literature

☑ 147 **The Market Outlook**—Auto Makers Step Up Demand

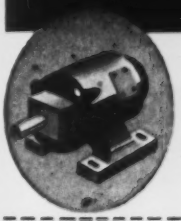
150 Steel Distribution Patterns Shift
157 Price Indexes and Composites
159 Steel Prices—Ores, p. 165; Ferroalloys, p. 166
169 Scrap Market Trends—Prices, p. 170
172 Nonferrous Metals
174 Nonferrous Metal Prices
177 Advertising Index

Behind the Scenes, p. 6; Letters, p. 10; Staff, p. 16; Meetings, p. 25; Index available semi-annually. STEEL also indexed by Engineering Index, 29 W. 39th St., New York 18, N. Y.

Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, O. Subscriptions in the U. S. and possessions, Canada, Mexico, Cuba, Central and South America, $10 a year, other countries, $20. Current issues, 50 cents each. Metalworking Yearbook issue, $2. Accepted as controlled circulation publication at Cleveland. Copyright, 1956, The Penton Publishing Co.

"PHOSPHOR BRONZE."

a tough, resilient, corrosion resistant alloy . . . is a vital part of our daily living . . .



ELECTRIC MOTORS
. . . run better and longer with bearings and wearing parts made of Elephant Brand Phosphor Bronze.

SWITCHES
. . . owe much of their life and usefulness to fatigue resisting parts of Elephant Brand Phosphor Bronze.

SPRINGS
. . . hold their temper and bounce longer and better if they are made of Elephant Brand Phosphor Bronze.

MARINE EQUIPMENT
. . . resists water and weather with engine parts and hardware made of Elephant Brand Phosphor Bronze.

ELECTRONIC EQUIPMENT
. . . functions accurately and efficiently with components of Elephant Brand Phosphor Bronze.

The best bears either of these two marks

ELEPHANT BRAND.

THE PHOSPHOR BRONZE CORPORATION
Subsidiary of The Seymour Manufacturing Company
3 Franklin Street, Seymour, Connecticut

DEPENDABLE
QUALITY • PRICE • SERVICE
Electro-manganese
99.9+%
STANDARD OF THE WORLD FOR PURITY
MN
ALSO AVAILABLE
Nitrelmang
A Stable Nitrided ELECTROMANGANESE
Both made by the pioneer producer of electrolytic manganese.
FOOTE MINERAL COMPANY
Electro-manganese DIVISION
BOX 479 • KNOXVILLE, TENNESSEE
WRITE FOR BOOKLET

behind the scenes

Atoms To Heat Ohio

One day in the spring of 1803, Ohio's first governor, Edward Tiffin, assumed his seat in Chillicothe. He pressed his index finger firmly against his cheek bone—which was connected with his head bone—and began thinking. "What can I do," he murmured, "to attract new business to this spankin' new State of Ohio?"

The curious manner in which history repeats was observed again last month. Gov. Frank J. Lausche, Ohio's 57th chief executive, tilted his gubernatorial chair in Columbus, assumed an attitude of deep thought and murmured: "What can I do to attract new business to this great old state? Atomic business, that is."

In his capacity as general chairman of the Ohio Conference on Peacetime Uses of Nuclear Energy & Radiation Safety, the Honorable Frank figured Ohio was ripe for atomic expansion, so he rushed off to Washington to seek advice from the Atomic Energy Commission. He was referred back to Ohio — back to STEEL, as a matter of fact, to our own Dr. Allen G. Gray, technical editor, scientist and atomic expert from 'way back. So Dr. Gray went to Columbus, told the conference how to get atomic business, and now the next step is up to the governor. Personally, we hope the following step won't be UP.

Tote That Bale

STEEL's program for management article this week examines a situation that has baffled management since before the building of the pyramids: How to motivate men to produce more. What good are norms, quotas, stretch-outs, double time, overtime, bounty money, bonus money or any other stimuli if all workers react differently? Human beings are not machines; so incentives must be tailored to souls instead of shafts. James F. Lincoln, an industrial psychologist as well as an industrial tycoon, has devoted much attention to the subject of worker productivity, and the article includes a liberal sample of his methods and philosophy. Here is a Program for Management article, authored by Associate Editor Bill Dean, that reveals how worker productivity can be increased by improving climate and communications, and by instilling true incentive in the individuals.

These management articles are always well received, and their influence is widely felt. In the July 16 STEEL, Associate Editor Mike Webster assembled a timely feature called "How To Live with SUB." It disclosed how labor could keep steady jobs, and how management could maintain steady production under the same roof with Supplemental Unemployment Benefits. Mike became such an authority on the subject he was invited to Pittsburgh a few days ago to speak before the second annual seminar on Linear Programming and Inventory Management at the Penn-Sheraton hotel. His subject, "How To Live with SUB—Stabilizing Employment at Lower Cost," would never get him on the same program with Elvis Presley, but Mike takes comfort in the reflection that Elvis probably wouldn't be able to talk learnedly about SUB, and there you are.

Synchronize Watches

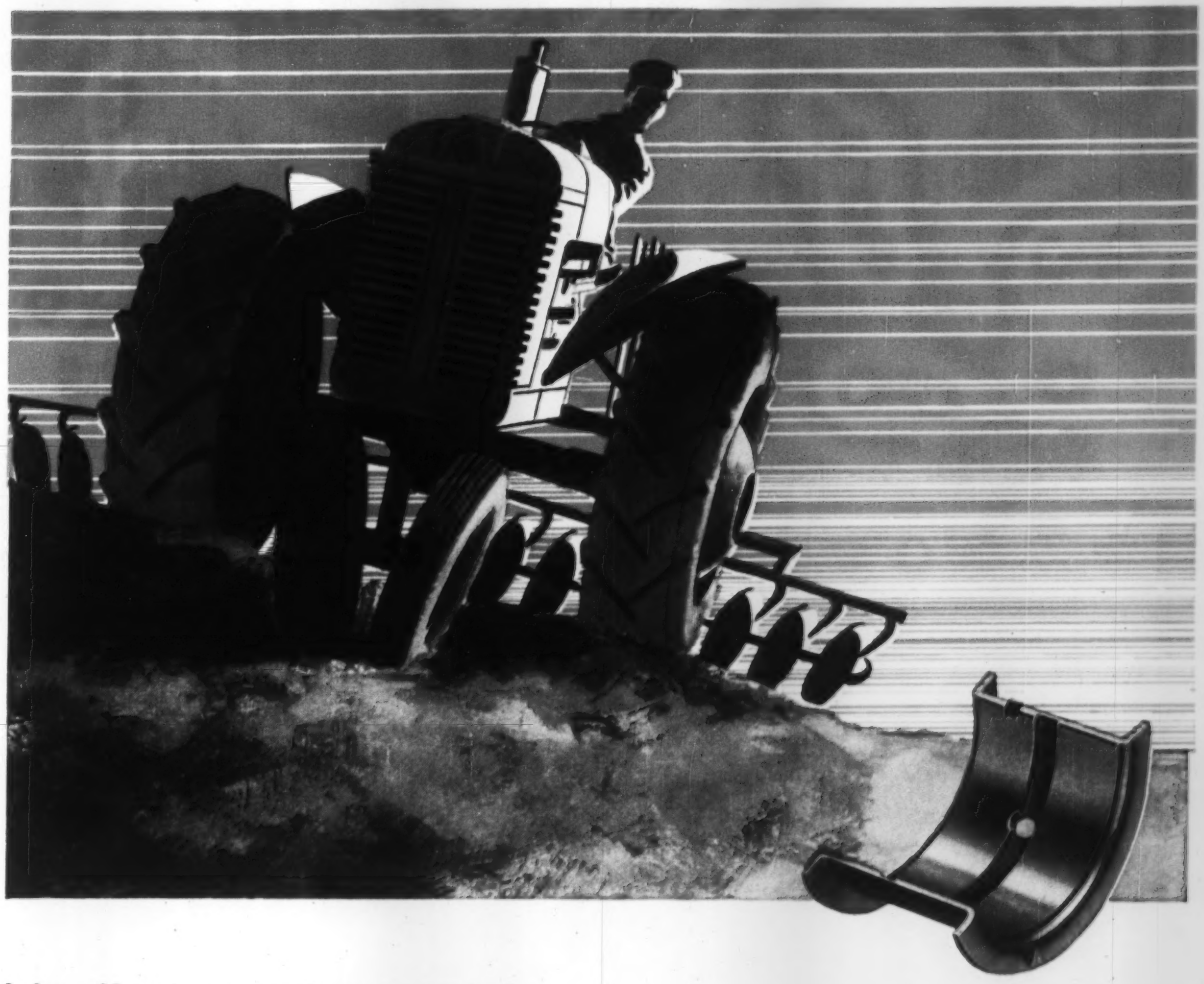
On Aug. 20 we ran a cryptic square root problem. All the experts came up with this solution: 3194. However, A. J. Forsythe, methods and process engineer, Witte Engine Works, Kansas City, Mo., declared that the answer was 3156, and offered a detailed solution. Then Russ Willis, Sales Department, Northwestern Steel & Wire Co., Sterling, Ill., sent in two pages proving that the answer was 3256. He suggested that we had left out one asterisk, too. Not knowing square root from licorice root, we'll have to string along with the experts.

Play with this one: It is precisely 5 o'clock. Within the hour the hands will stand at an angle of 30 degrees, the minute hand being before the hour hand. Then the minute hand will pass the hour hand, and presently make an angle of 60 degrees on the other side. How much time will elapse between these two events?

Shrdlu

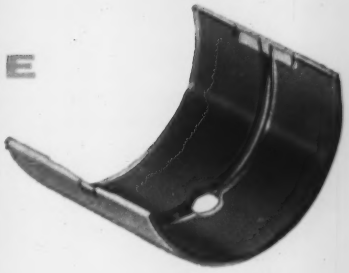
(Metalworking Outlook—Page 59)

RESEARCH • DESIGN • METALLURGY • PRECISION MANUFACTURING



his first requirement is . . .

DEPENDABLE PERFORMANCE



Ingenious mechanical equipment has solved the labor problem for today's farmer. But his first requirement of any unit is dependability of operation—around the clock if need be—in his constant battle with nature. Federal-Mogul bearings have been assuring dependability in farm tractors and implements for generations. The same dependability characterizes Federal-Mogul bearings in any application, from automobiles to construction equipment—dependability that is the product of over 50 years' highly specialized bearing manufacture.

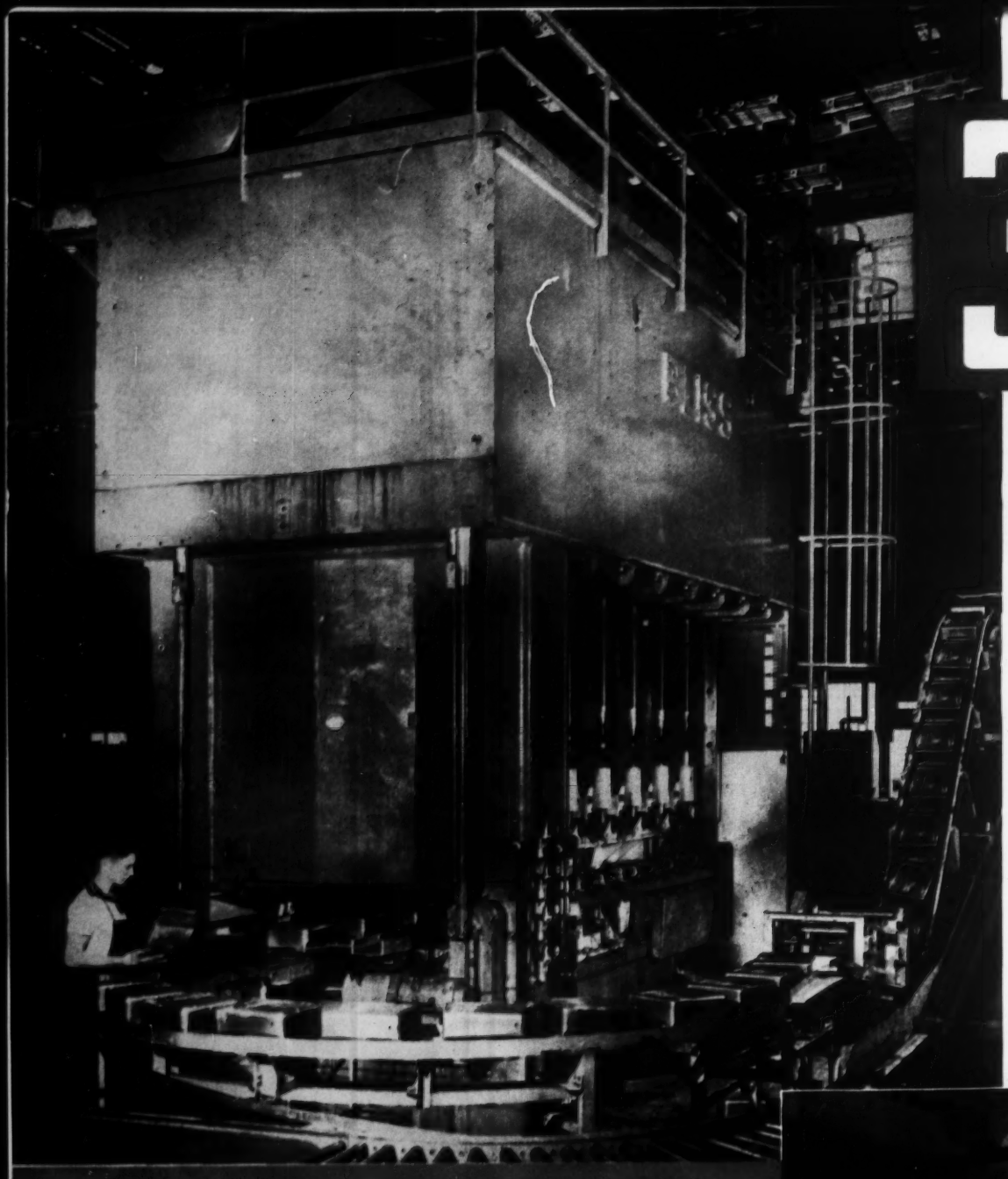
FEDERAL-MOGUL DIVISION

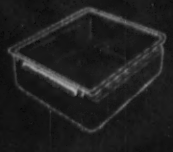
FEDERAL Mogul

SINCE 1899

FEDERAL-MOGUL-BOWER BEARINGS, INC., 11051 SHOEMAKER, DETROIT 13, MICHIGAN

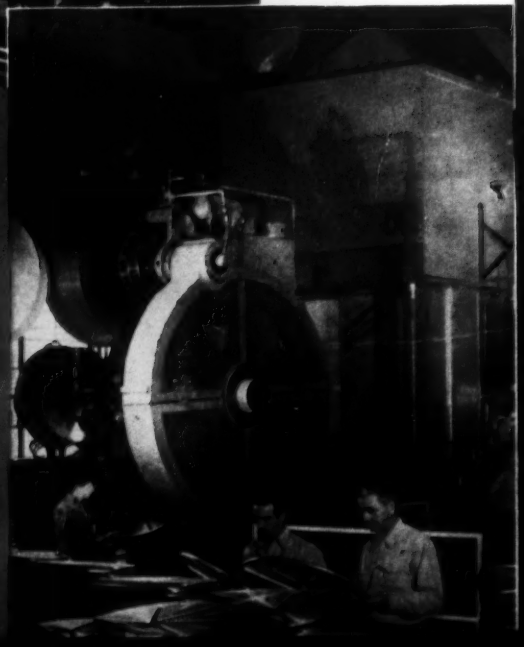
3





THIS ONE MAKES PANS . . . Pans are produced at the rate of ten a minute in this 700-ton seven-station Bliss transfer feed press. A 22" x 24" blank is drawn 5⅛" deep in the first station; trimming, piercing and restriking operations follow. Pans leave the press completely finished — ready for plating and enameling.

THESE TWO MAKE SHELVES . . . "Lazy Susan" shelves by the millions are the product of these two 800-ton Bliss transfer feed presses and the two Bliss embossing presses stationed at their output ends. Coil stock is blanked in the first station of the presses and work pieces carry through the remaining five stations and into the embossing press automatically. Each press produces 15 shelves per minute through two shifts.



BLISS TRANSFER FEED PRESSES STEP UP GE REFRIGERATOR PRODUCTION

Between them, they make all the pans and all the shelves GE needs for its annual output of more than half a million refrigerators!

Here's what's happening at Appliance Park: 6000-pound coils of steel feed into one end of these Bliss transfer feed presses, lines of shelves and pans march out the other ends, and only a few attendants stand by in between.

Three separate press lines are involved. One is a 700-ton, seven-station press (with coil cradle, straightener and roll feed) that produces ten deep-drawn pans a minute.

The other two – identical set-ups – are 800-ton, six-station presses, also with cradle, straightener and feed, which feed into 800-ton embossing presses (see photo). Each produces shelves at the rate of 15 per minute.

The method of operation is the same for all. Mill coils are loaded on the cradle. From there, strip feeds through the straightener and into the roll feed. At the first die station in the press a blank is cut off. The transfer feed fingers move in on the work piece and carry it to the next station. As the slide comes down, the fingers move out; as it rises, they move in and repeat the cycle. New strip is brought to the first station and a completed part delivered with every stroke of the press.

This set-up has solved a number of knotty problems for General Electric. Previously production required the services of two or three vendors, doubling and tripling the cost of dies and labor. Still further savings have come from the use of standard mill coils instead of blanks. In fact, the savings are expected to bring about an early amortization of the entire installation.

Bliss has been building transfer feed presses and systems like this since Spanish-American War days; today, over a thousand are in use. If you're faced with long-run production problems, let a Bliss engineer show you some typical uses of the transfer feed principle. Perhaps it can pull your production costs into line – as it has for so many others.

SEE IT IN ACTION . . . *A new color-and-sound movie takes viewers to the plant, shows the press in action. See close-ups of tooling, of transfer fingers, of coil feed techniques. To arrange a showing at your plant, write to E. W. Bliss Company, Canton, Ohio, or see your local Bliss representative.*

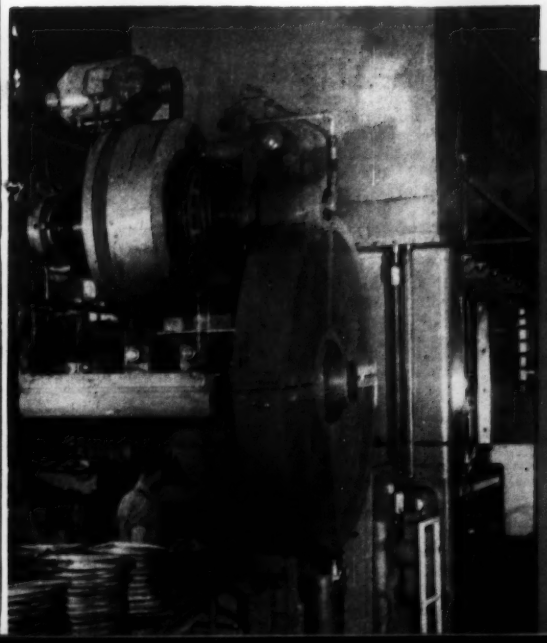
BLISS
SINCE 1857

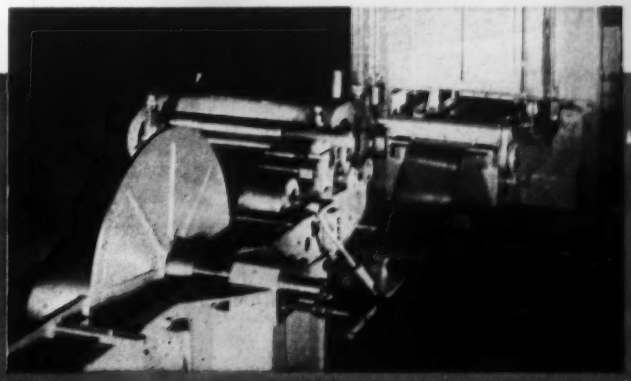
E. W. BLISS Company, Canton, Ohio

PRESSES, ROLLING MILLS, SPECIAL MACHINERY

is more than a name . . . it's a guarantee

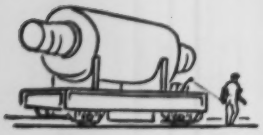
U. S. Plants in Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; Midland and Pittsburgh, Pa.; San Jose, Calif. *Branch Offices in* Burbank, Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, San Jose, Salem, Toledo, Washington, D. C.; and Toronto, Ontario, Canada; E. W. Bliss (England) Ltd., Derby; E. W. Bliss Co. (Paris), France. *Other representatives throughout the world.*





ALL THREE LINES WORK FROM COIL STOCK . . . A number of handling operations are eliminated because, on each of the three presses, strip from standard-sized mill coils are fed from this power coil cradle through a five-roll straightener and into the roll feed on the press. Blank is cut off in the first die station of the press. Though not shown here, a second coil is ordinarily held ready at the rear of the cradle to speed handling. Bliss engineers designed all the coil handling equipment and all of the tooling for each of the presses.

ATLAS SAFETY TYPE "SHORT HAUL" TRANSFERS



Atlas Safety-Type Transfers provide safe, low-cost service. Available with gas or diesel-electric, cable reel, or storage battery power. Atlas Transfers handle any type of load . . . and the heavier the load, the greater the savings.

20-TON STORAGE BATTERY FLAT CAR

20-TON STORAGE-BATTERY WITH CRADLE FOR PIPE

Request "Walk-Along" Bulletin 1283

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

LETTERS TO THE EDITORS

Service Is Appreciated

Please send copies of the article, "How To Braze Stainless" Part I (Sept. 3, page 94) and Part II (Sept. 10, page 158).

This service (providing such valuable practical information) is greatly appreciated.

R. Nagy
Engineering Department
Aeronautical Division
Robertshaw-Fulton Controls Co.
Anaheim, Calif.

We would like a copy. The Brazing series has been most interesting.

Mrs. Mary H. Woolhandler
Librarian—Department 64
Industrial Engineering
Columbus Division
North American Aviation Inc.
Columbus, O.

Atomic Request from Japan

Your article, "Atomic Planes Are Closer Than You Think" (Aug. 20, page 116), is interesting to me. Please send a copy.

T. Otsuka
Manager-Technical Research Department
Sumitomo Metal Industries Ltd.
Amagasaki, Japan

Short Run Proves Profitable

We have found the articles in your Production Ideas series interesting, especially "Doing More with Short Run Dies" (Sept. 3, page 79). It concerns a subject which is of special value to us at this time. Please send us six copies of your article.

Frank J. Young
Vice President
Walter A. Lausterer Inc.
Philadelphia

Projection of Steel Demand

In October, we are having our annual sales conference. During the conference, we are planning on projecting general business conditions, as well as our own for 1957, and also the long term trend for the next five or ten years.

Since our activities are confined to the metalworking field, we are anxious to pass on to our sales organization your opinion on what the trend will be for new orders for steel in 1957 and also for the long term.

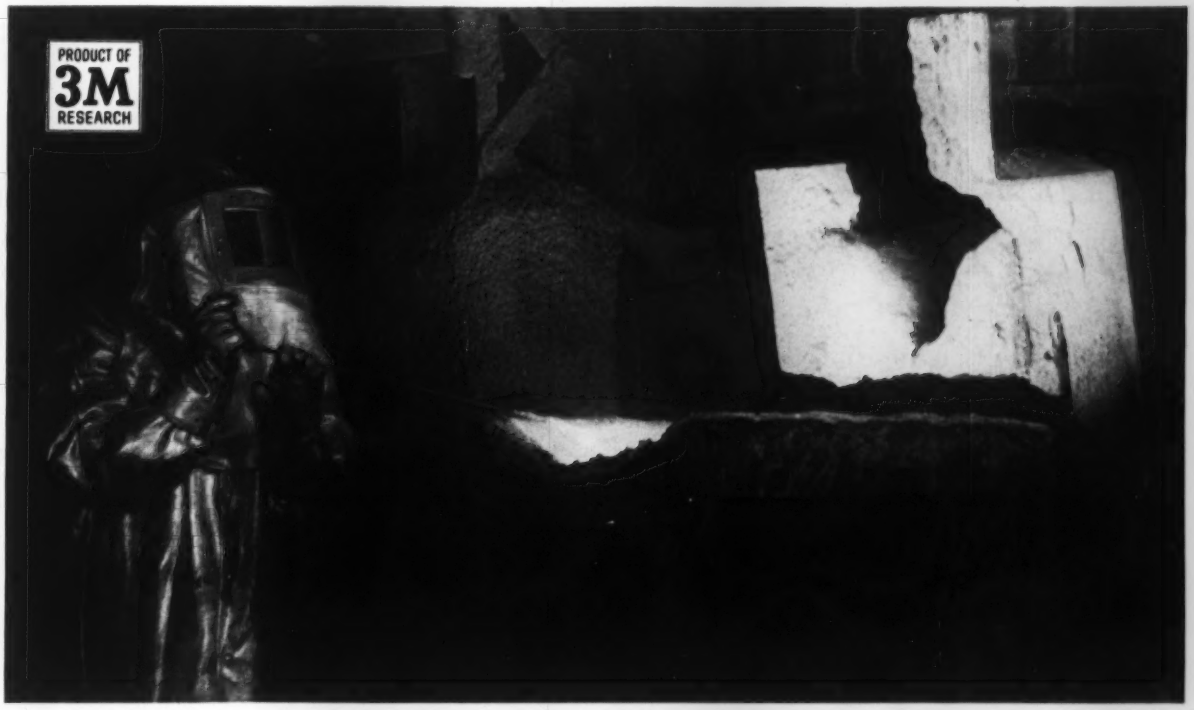
Your co-operation has been helpful to us in projecting our figures in previous years.

C. T. Appleton
Vice President
Reed Roller Thread Die Co.
Worcester, Mass.

• *Indications point to a good demand for steel in 1957. It should be strong enough to put steel ingot production*

(Please turn to page 12)

New aluminized safety clothing reflects 90% of radiated heat!



Lightweight garments protect men against 2100° F. heat... let you cut furnace downtime up to 75%!

No more lost profit for your mill when new "3M" Aluminized Fabric safety garments are on the job.

This new safety clothing *reflects* heat . . . doesn't merely insulate against it! It can take far higher temperature exposures than the bulky, heavier old style clothing. Because it turns back up to 90% of radiated heat, you don't have to shut down for repairs . . . Men wearing this new lightweight clothing have changed the doors on ingot reheating furnaces with the furnace operating at 2100° F.

Work that used to take days now can be done in hours!

Men *like* to wear it, too. It's light, comfortable, flexible . . . easy to work in. And it lasts up to 50% longer than conventional garments. Aluminized asbestos fabric *sheds* molten splash . . . doesn't burn. A complete range—gloves, aprons, suits, helmets, etc.—is available.

Get the money-saving facts on new 3M Brand Aluminized Fabric now. Send coupon today for data and FREE sample.

3M Brand Aluminized Fabric Garments are available from leading safety clothing manufacturers.

Aluminized Fabric

3M COMPANY

The term "3M" is a registered trademark of Minnesota Mining & Mfg. Co., St. Paul 6, Minn. General Export: 99 Park Avenue, New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

Minnesota Mining & Manufacturing Co.
Dept. KD-96, St. Paul 6, Minn.

Please send complete details and free sample of new "3M" Brand Aluminized Fabric.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

MANPOWER for Industry in NORTH CAROLINA

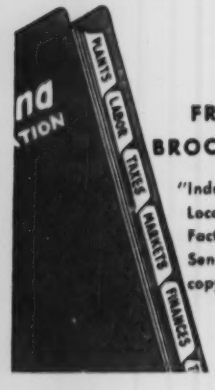
Industries locating and expanding in North Carolina have access to the nation's largest labor pool. A supply of young and healthy people, over 99 per cent native-born, eager to work, easily trained, is conveniently available.

This great source of desirable men and women employees is swelled each year as mechanization comes to the farms, and as more students graduate from the schools.

A network of paved secondary rural roads links factories with dependable labor dispersed over a large radius. This same outstanding highway system also makes it possible for workers to hold down full time jobs and at the same time easily supplement their income with "kitchen" gardens and small scale farming.

These people live pleasantly and comfortably, too—over 96 per cent of all farm homes are electrified.

More information about North Carolina's labor supply and other industrial advantages will be gladly supplied in confidence and at no obligation.



FREE BROCHURE

"Industrial Location Factors". Send for a copy today.

Department of
CONSERVATION AND DEVELOPMENT
Raleigh 10, North Carolina
William P. Saunders, Director

NORTH CAROLINA
YEAR 'ROUND MID-SOUTH

LETTERS

(Concluded from page 10)

ahead of the 1956 output, which we estimate will be 114.5 million tons.

Inventories won't be a depressant to demand for steel. With inventories reduced during the strike, consumers will not live off them to any extent but will buy steel at their rate of usage.

Steel consumption should continue high for some time to come. There are many expansive factors in our economy. The population is increasing, incomes are up and an increasing proportion of the people are in the higher income groups. Our standard of living is rising. We want more things, and we are able to buy them. All make for an increasing demand for steel.

Ultrasonic Testing for Cracks

In the Aug. 27 issue, you presented an interesting article, "Ultrasonic Testing by the Immersion Method" (page 94). Please send me a reprint.

E. L. Williams Jr.
Production Engineering Department
Lockheed Aircraft Corp.
Marietta, Ga.

Supervisors To See Editorial

We note with interest your editorial "Is Bigness Bad?" (Aug. 27, page 45), and wonder if we can get permission from you to reprint.

Your comments would be carried in a forthcoming issue of our *Supervisors Newsletter.*

Sidney L. Baker
Director-Employee Communications Program
Ex-Cell-O Corp.
Detroit

• *Permission granted.*

Synthetic Lubricants Do Job

In your Aug. 27 issue (page 80), is an article, "Lubricants of Tomorrow" in which we are vitally interested. We should like to have three or four reprints.

Our congratulations upon this excellent presentation.

Zell G. McGee
President
McGee Chemical Co. Inc.
Upper Darby, Pa.

Foundrymen To See Article

We would like to receive seven copies of the article, "CO_2 Speeds Core Making" (Aug. 6, page 111).

We found this article extremely interesting and would like to send copies of it to all our foundry divisions.

A. D. Kattelle
Assistant General Purchasing Agent
American Brake Shoe Co.
New York

Pumping Molten Lead

I have been advised that your July 16 issue contains an article describing an operation whereby some company pumps molten lead from place to place throughout its building.

We are planning on setting up such on operation and have, in fact, done experimental work on the problem. I am extremely interested in reading this article. May I have a copy?

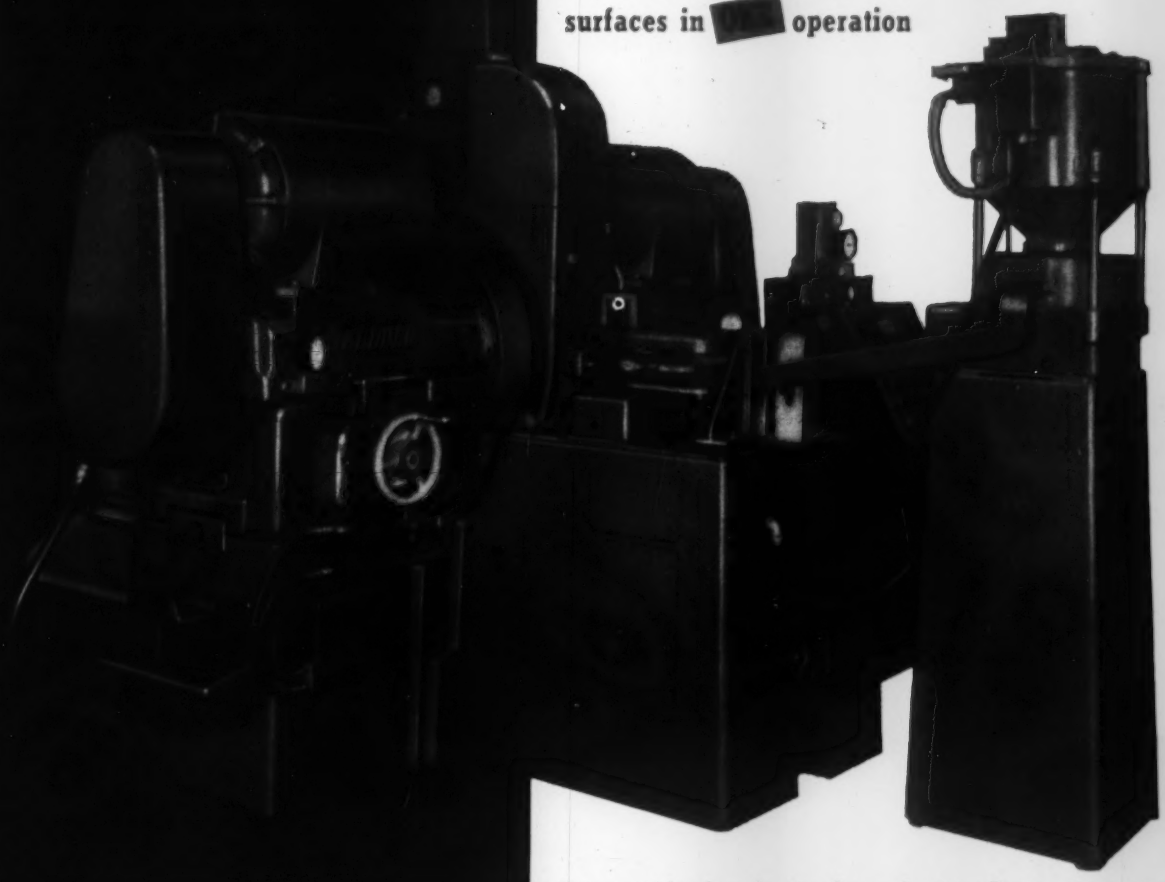
Glenn E. Elvidge
Miami Daily News
Miami, Fla.

• *The article is "Handling Hot Lead" (page 155). We are sending a copy.*

9 hours production in 8 hours . . .

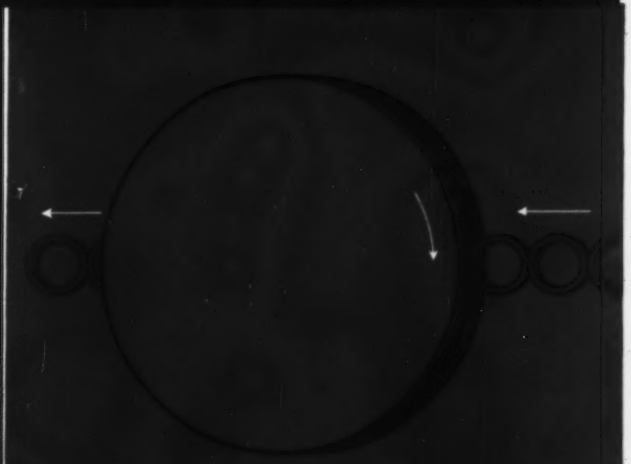
disc grinding 6000 bearing races per hour

NEW Gardner 2H30 disc grinder automatically precision grinds [redacted] parallel surfaces in [redacted] operation



Automatic loading for steady production. Automatic gaging maintains accurate workpiece size through feedback signals.

Former Model		New 2H30
5280 per hr.	PRODUCTION	6000 per hr.
.005"—.007"	STOCK REMOVAL	.006"—.008"
	TOLERANCES	
.0001"—.0002"	FLATNESS	.0001"
.0001"—.0002"	PARALLELISM	.0001"
.001"	UNIFORMITY	.0005"



GARDNER

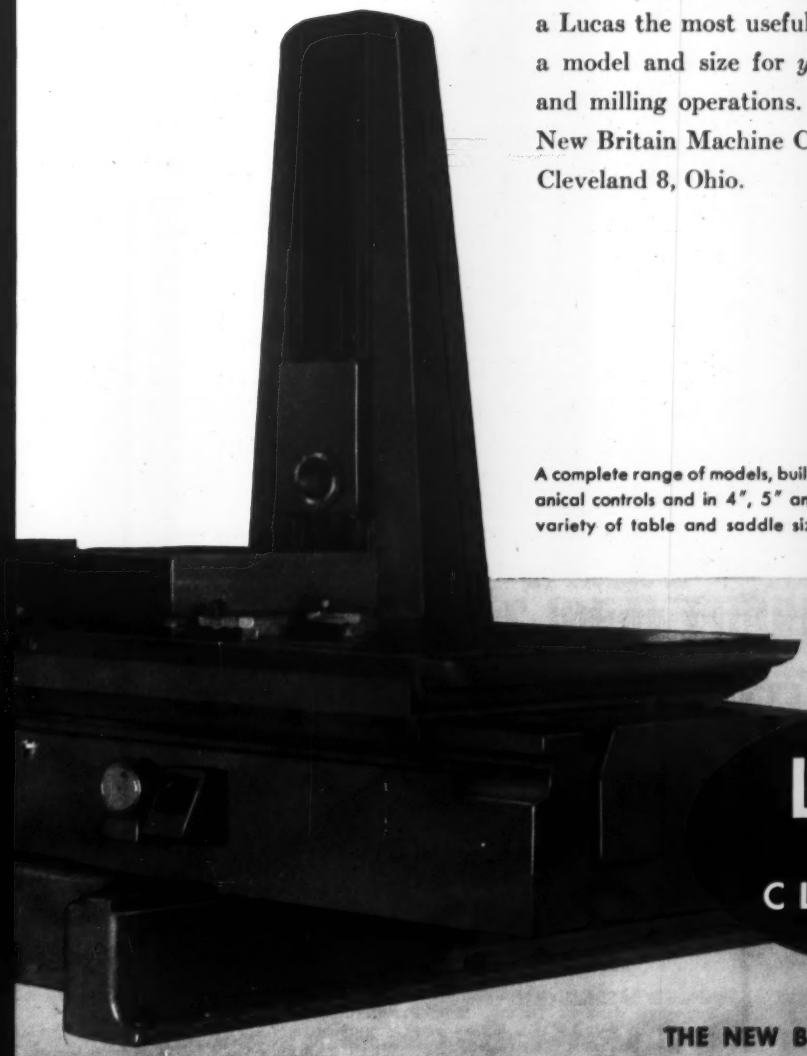
precision disc grinders

BELOIT, WISCONSIN

Model 6120 Lucas Precision Horizontal Boring, Drilling and Milling Machine.

"the machine that can do anything"

Extreme accuracy, feather-touch pendant control, automatic power positioning for repetitive work make a Lucas the most useful machine in any shop. There's a model and size for *your* horizontal boring, drilling and milling operations. Lucas Machine Division. The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.



A complete range of models, built in 3", 4" and 5" spindle sizes with mechanical controls and in 4", 5" and 6" sizes with electrical controls. Wide variety of table and saddle sizes with two or four-way beds optional.

LUCAS
OF
CLEVELAND

A DIVISION OF
THE NEW BRITAIN MACHINE COMPANY

WARD STEEL CO.

We specialize in
FINISHED STEEL
BARS—TUBES—STRIP

PROMPT WAREHOUSE SERVICE ONLY

Most Complete Stock in America of
BLUE TEMPERED SPRING STEEL

We believe that the way to sell is to carry a stock which permits satisfying any reasonable warehouse demand

[illegible] Ridge Ave. (at Pierce) UN 4-2400
CAMBRIDGE 40, MASS.

Branch
3042-3058 W. 51st Street, CHICAGO 32
Phone Grovehill 6-2600

there's so much to choose from at Hotel Cleveland!

What's your pleasure? Fabulous roast beef in Cleveland's first specialty restaurant The Rib Room. Dancing to a famous orchestra in the smart Bronze Room. Relaxing over a drink in the stag Men's Bar. You'll find something to suit every taste and mood at Hotel Cleveland.

And you're in the very heart of town, close to business, shopping and theaters . . . directly connected with Union Passenger Terminal.

STEEL
The Metalworking Weekly

Editor-in-Chief, IRWIN H. SUCH
Editor, WALTER J. CAMPBELL
Associate Managing Editors, VANCE BELL, JOHN S. MORGAN

WILLIAM M. ROONEY ..... *Market Editor*
J. D. KNOX ..... *Steel Plant Editor*
HARRY CHANDLER ... *Copy Editor*
FRANK R. BRIGGS ..... *Associate Editor*
ROBERT O. JAYNES ..... *Associate Editor*
AUSTIN E. BRANT ..... *Assistant Editor*
BYRON E. KENNEL ..... *Assistant Editor*
ROSS WHITEHEAD ..... *Assistant Editor*
JOHN R. BOTTUM ..... *Assistant Editor*
MARY ANN STUVE ..... *Editorial Assistant*
ALLEN G. GRAY ..... *Technical Editor*
ROBERT F. HUBER .... *Machine Tool Editor*
VAN CALDWELL ..... *Associate Editor*
MICHAEL A. L. WEBSTER .. *Associate Editor*
GLENN W. DIETRICH .... *Assistant Editor*
MARY T. BORGERHOFF .... *Assistant Editor*
MARY ALICE LYMAN ..... *Assistant Editor*
EILEEN CORTES ..... *Assistant Editor*
JUNE TUTTLE ..... *Editorial Assistant*
THOMAS H. BRYAN, TOM WELSH, *Art Editors*
BEVERLY CLINE ... *Editorial Service*

Resident Editors

New York 17 ..... 60 E. 42nd St.
B. K. PRICE, L. E. BROWNE
STANLEY B. STEWART
Murray Hill 2-2581

Chicago 11 ..... 520 N. Michigan Ave.
ERLE F. ROSS, WILLIAM E. DEAN
Whitehall 4-1234

Pittsburgh 19 ..... 2837 Koppers Bldg.
ROBERT M. LOVE
Atlantic 1-3211

Detroit 35 ..... 15800 W. McNichols Rd.
A. DONALD POSTMA
Broadway 3-8150

Washington 4 .... 1123 National Press Bldg.
JAMES P. MORRISSEY
Executive 3-6849

London, 2 Caxton St., Westminster S. W. 1
VINCENT DELPORT
European Editor

Editorial Correspondents

Birmingham ..... R. W. KINCEY
Birmingham 3-1121

Buffalo ..... GEORGE E. TOLES
Emerson 5385

St. Louis ..... HAMILTON THORNTON
Jackson 1-9281

Youngstown ..... GEORGE R. REISS
Riverside 7-1471

Los Angeles ..... NORMAN LYNN
Webster 5-3040

San Francisco ..... EDWIN HAVERTY
Yukon 6-5151

Seattle ..... R. C. HILL
Melrose 1895

Cincinnati ..... DICK HAVLIN
Beechmont 1-9607

Toronto, Canada ..... F. S. TOBIN
Empire 4-9655

Birmingham, England ..... J. A. HORTON

Paris, France ..... LEON JAUDOIN-PROM

Brussels, Belgium ..... PAUL DE KEYSER

Dusseldorf, Germany .. DR. HERBERT GROSS

BUSINESS STAFF

Advertising Director ..... H. G. ROWLAND
Advertising Service Mgr. .. DORIS MITCHELL
Production Manager ..... A. V. ANDERSON
Promotion Director ..... S. F. MARINO
Classified Advertising ..... EVELYN DIETZ
Marketing Director ..... D. C. KIEFER
Circ. & Research Dir. ... N. R. LADABOUCHE
Circulation Manager ..... G. R. EBERHOLE
Direct Mail Service ..... AMY LOMBARDO
Reprints ..... JUNE SCHILENS

Advertising Representatives

New York 17 ..... 60 E. 42nd St.
K. A. ZOLLNER, GUY LABAW
Murray Hill 2-2581

Philadelphia ..... 200 Wynnewood Ave.
Wynnewood, Pa.
WM. J. VERSCHOOR—Midway 2-6512

Farmington, Conn. ..... 12 Farmstead Lane
CALVIN FISHER JR.—Orchard 7-1756

Rochester, N. Y. ..... 217 Ridgeview Dr.
East Rochester, N. Y.
HAROLD A. DENNIS—Browning 2105

Pittsburgh 19 ..... 2837 Koppers Bldg.
J. C. SULLIVAN—Atlantic 1-3211

Cleveland 13 ..... Penton Bldg.
J. K. GILLAM, N. W. MANNING
Main 1-8260

Cincinnati 6 ..... 2215 Victory Pkwy.
E. L. FRANKE—Parkway 1-0711

Detroit 35 ..... 15800 W. McNichols Rd.
C. A. TALLINGER JR.—Broadway 3-8150

Chicago 11 ..... 520 N. Michigan Ave.
L. C. PELOTT, W. L. POLAND
WM. J. D'ALEXANDER
Whitehall 4-1234

Los Angeles 36 ..... 5943 W. Colgate Ave.
F. J. FULLER—Webster 1-6865

San Francisco 4 ..... 57 Post St.
Robert W. Walker Co.
Sutter 1-5568

Griffin, Georgia ..... 1106 Pine Valley Rd.
FRED J. ALLEN—Griffin 7854

BPA

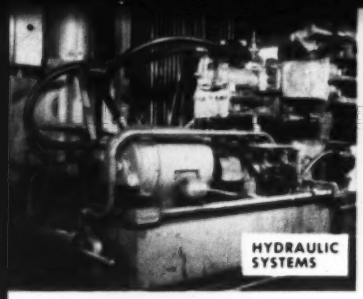
NBP

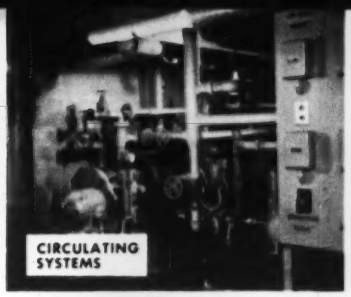
Published Every Monday by
THE PENTON PUBLISHING CO., Penton Bldg., Cleveland 13, O.
MAin 1-8260

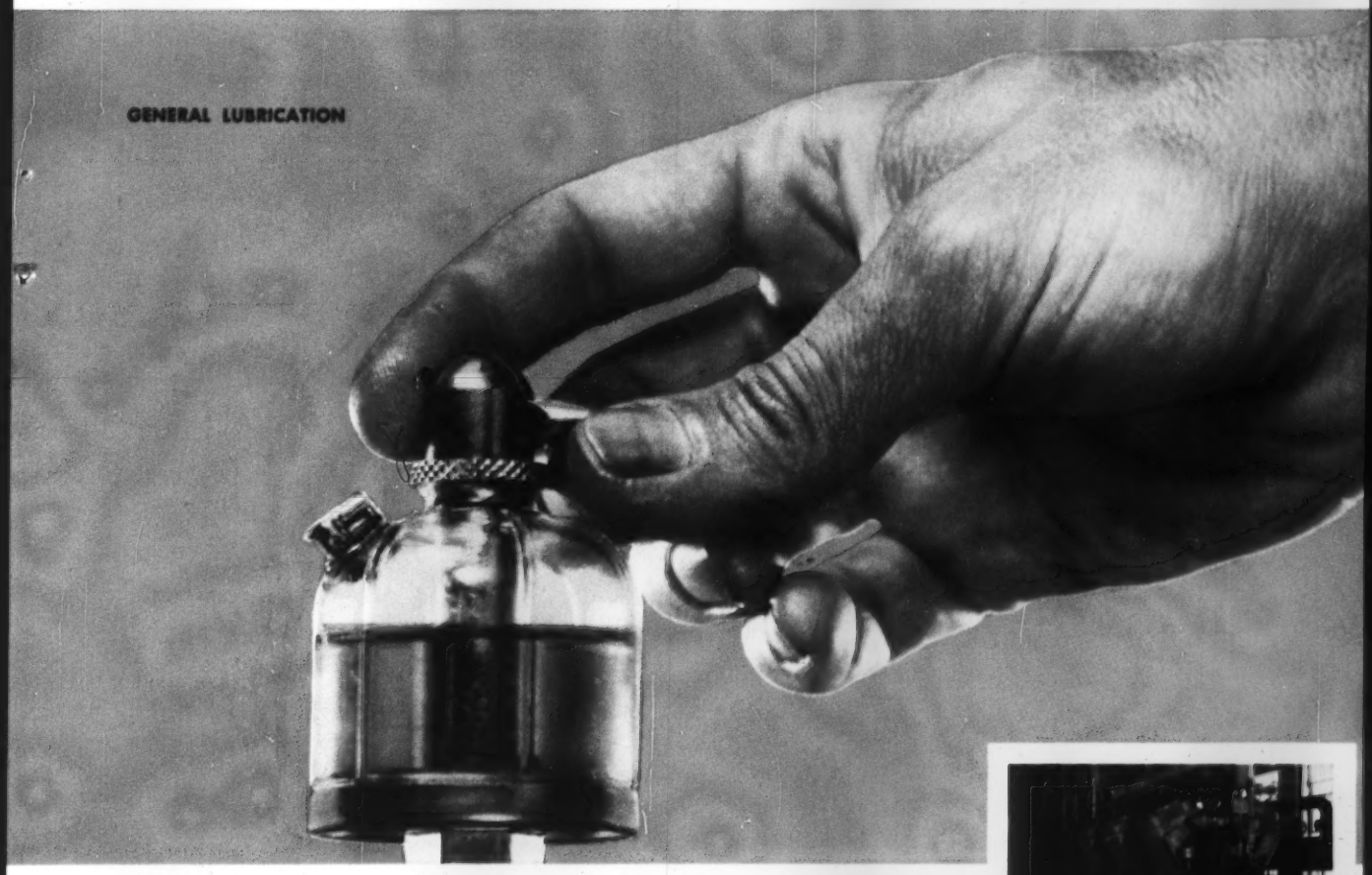
GEORGE O. HAYS ..... *President*
RUSSELL C. JAENKE ..... *Executive Vice President*
FRANK G. STEINEBACH ... *Vice President and Secretary*
FRANK O. RICE ..... *Vice President*
JOSEPH P. LIPKA ... *Treasurer and Assistant Secretary*

Also Publisher of
FOUNDRY, MACHINE DESIGN, NEW EQUIPMENT DIGEST, AUTOMATION

Member of Business Publications Audit of Circulation Inc., Society of Business Magazine Editors and National Business Publications Inc.







SUN SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

Moderately priced...low in carbon-forming tendencies, Sun Solnus® oils simplify your storage problems by doing with *one oil* many jobs that would otherwise require *several.* Their ability to protect metal parts against corrosion, their resistance to oxidation, and their moderate price all add up to "more lubrication per dollar."

For technical information, see your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-51.

SUNOCO

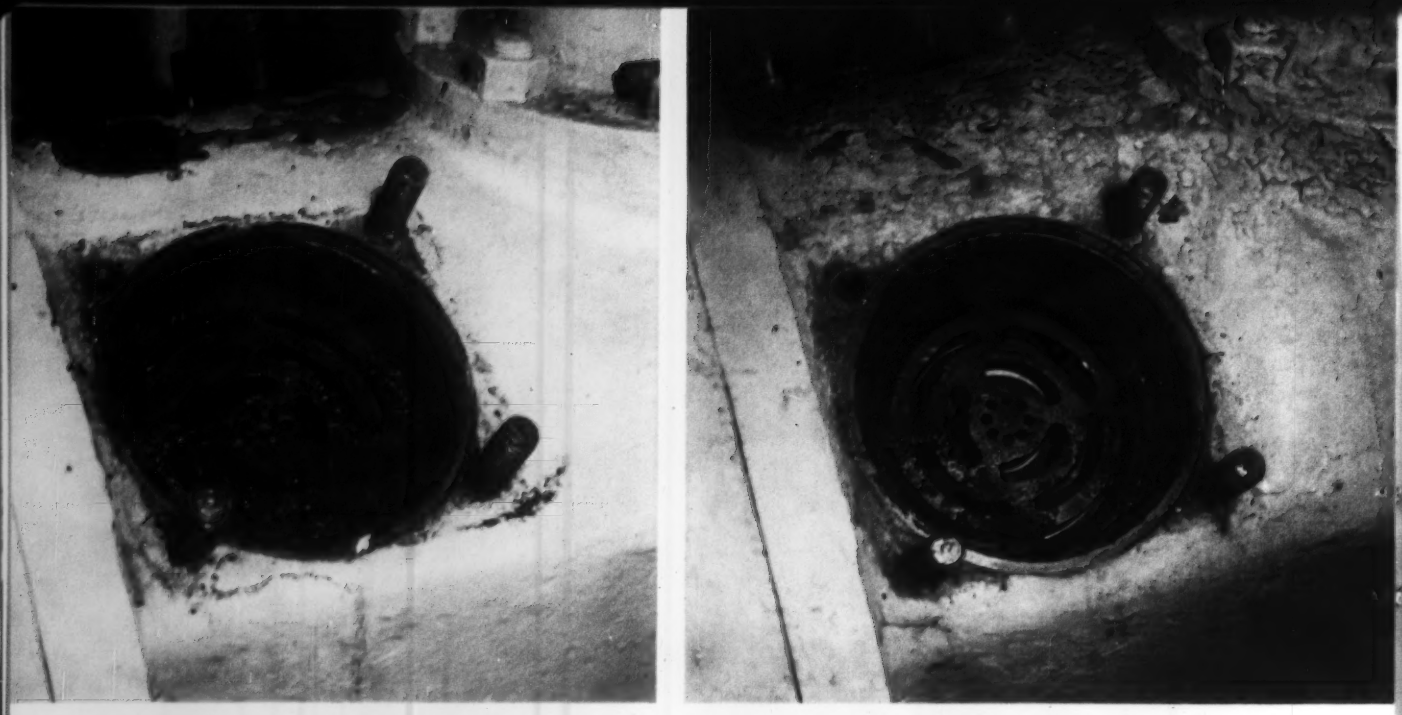
INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

© SUN OIL CO.

In Canada: SUN OIL COMPANY LIMITED, Toronto and Montreal



Valve on left is from compressor run for 3,000 hours with well-known, high-grade oil. At right is same valve after a 3,000-hour run with Sun Solnus oil. Note difference in carbon deposits.

3000-HOUR TEST PROVES SUN SOLNUS OILS REDUCE CARBON BUILD-UP IN COMPRESSORS

Equipment: A three-stage Norwalk horizontal-type compressor. Operating pressure: from 1,000 to 1,500 psi.

Test: The compressor was cleaned thoroughly and filled with a well-known, high-grade oil. The equipment was run for 3,000 hours, then torn down for inspection and cleaning. Then Solnus® 300 was tested in the same way.

Results: Look at the two pictures. You can see for yourself how Solnus oil reduced dangerous carbon build-up.

All types of reciprocating air compressors that have been changed over to a Sun Solnus oil show similar results. A test in your compressor will show the same remarkable reduction of carbon deposits.

You can get a technical bulletin about Sun Solnus oils by asking your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-52.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

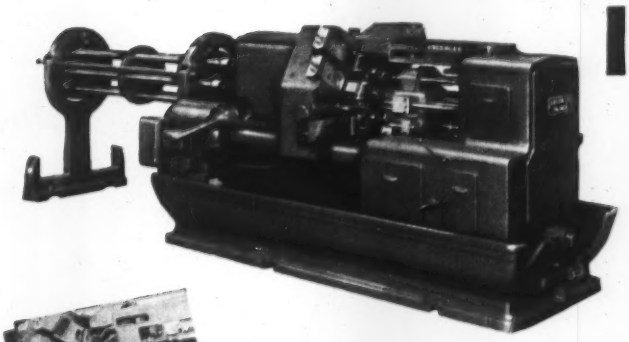
© SUN OIL CO.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

1. Simplified cross-slide camming
2. Interchangeable cross-slide tool holders
3. Quick-adjusting stroke mechanism
4. Rapid speed and feed changes
5. Wide-open, easily reached tooling area
6. Built-in threading feed and drive
7. Easily accessible main toolslide holders
8. Stationary type collets changed quickly

eight big reasons why you get *Fast Setups* on GREENLEE BAR AUTOMATICS

In plant after plant countless hours of setup time are saved each year on Greenlee Bar Automatics. Similar savings in time and money can be achieved in your own plant. Greenlee has on-the-job case studies to prove it. Whether your responsibility lies in the field of management . . . production . . engineering . . . or purchasing you owe it to yourself and your company to call in the Greenlee man. Let him show you why and how faster setups on a Greenlee pay off in greater profits.



PRODUCTION MACHINERY
GREENLEE

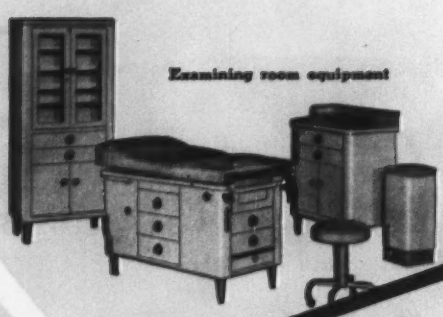
4-SPINDLE...6-SPINDLE
SECOND-OPERATION
PNEUMATIC STOCK FEED

WRITE TODAY FOR CATALOG A-405

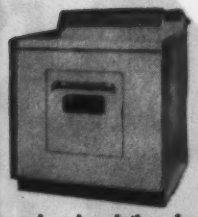
PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1933 Mason Avenue
Rockford, Illinois

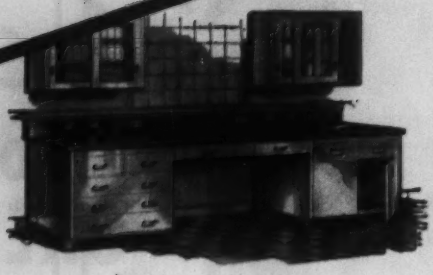
at **HAMILTON MFG. CO.**
Two Rivers, Wis.



Examining room equipment



Home laundry clothes dryer



Steel laboratory equipment

Accurate high production, at low cost, is maintained by a battery of Cincinnati Shears—in the manufacture of Hamilton automatic washers and dryers, hospital and laboratory equipment.

These money making Cincinnati features have brought results—

- Durable All-Steel Interlocked construction.
- Automatic Pressure Lubrication.
- Accurate Back Gauge.
- Powerful Hydraulic Holddowns.
- Inclined Ram.

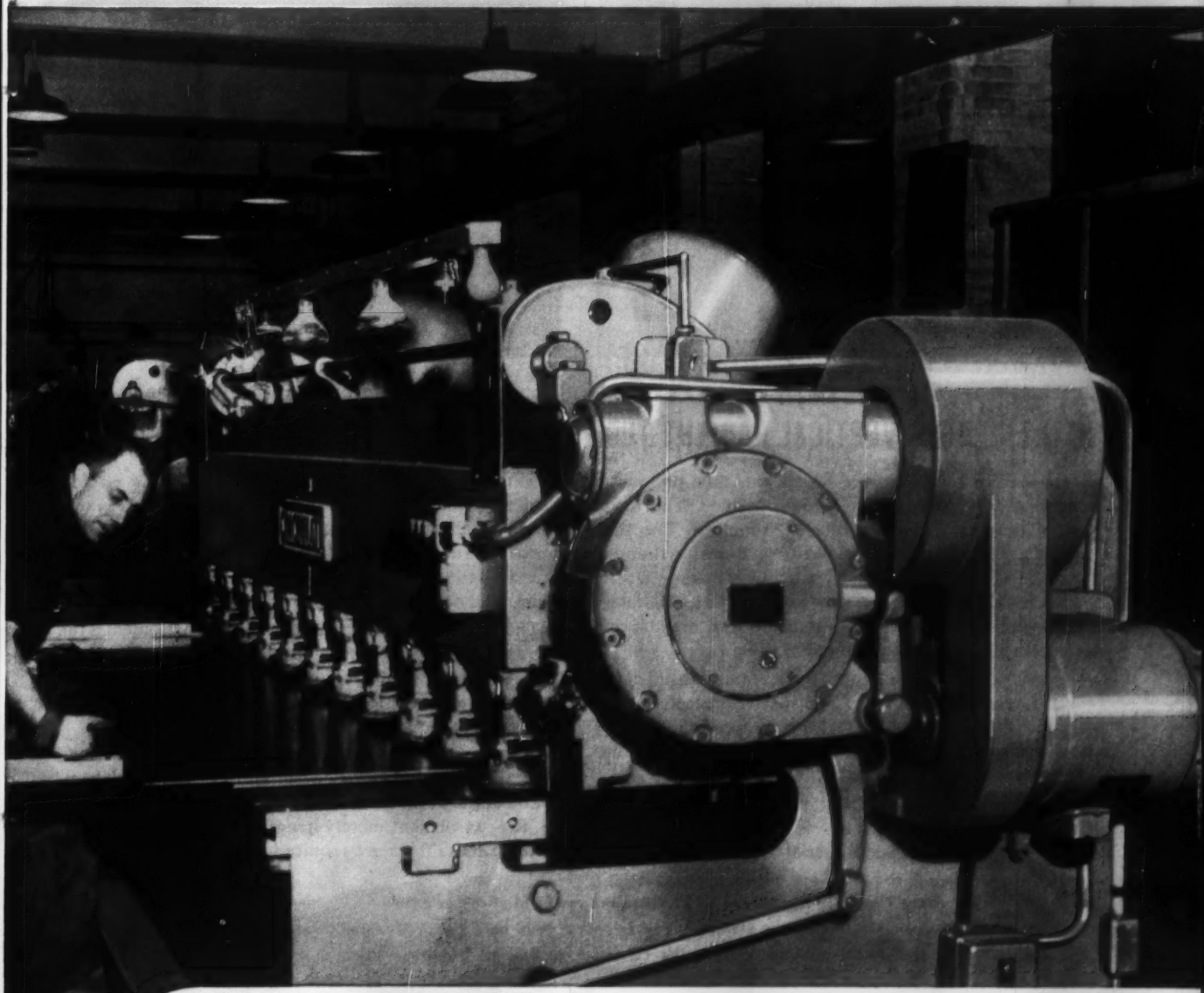
Cincinnati Shears accurately cut various thicknesses of material, without a change in knife clearance—this is a profitable time saver.

Photos courtesy the Hamilton Mfg. Company, Two Rivers, Wisconsin.

New front controlled power back gauges are now standard equipment on ALL CINCINNATI SHEARS.

Investigate these modern money making tools. Write for Catalog S-7.

...25,000,000 lbs. of steel sheared by cost cutting CINCINNATI SHEARS



THE CINCINNATI SHAPER CO.

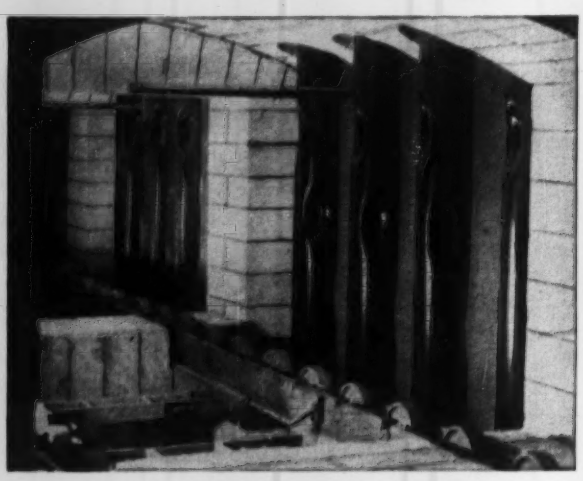
CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES

CINCINNATI

Whatever your source of heat...

LINDBERG HEAT TREATING FURNACES OFFER THESE EXCLUSIVE ADVANTAGES



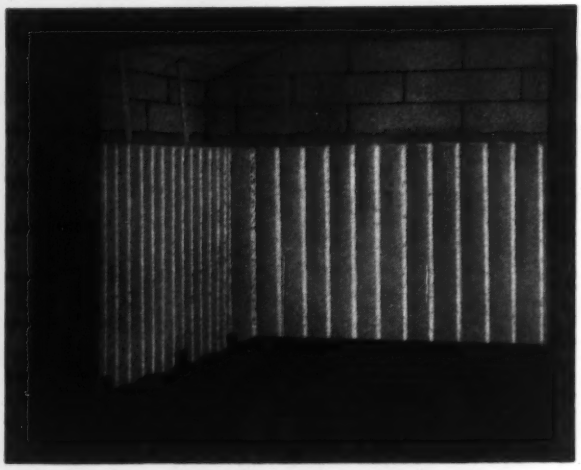
. . . IN THE GAS-FIRED FURNACE

NEW LINDBERG VERTICAL RADIANT TUBE

Because of its revolutionary design, this tube provides a new level of gas-fired furnace performance. The secret lies in the new Lindberg tube's "dimples." The tube carries a central stream of mixed air-and-gas surrounded by a cylindrical stream of air alone. Combustion occurs in the area between these two streams. The "dimples" create eddies accelerating combustion and maintaining even temperatures along the entire tube.

This Lindberg tube will operate at maximum efficiency for a longer period of time. The special protective coating gives greatest possible resistance to carbon penetration. Vertical position eliminates soot deposit and resultant temperature increases at points of sooting.

Tubes are 59 inches long, weigh only 29 pounds, changeable in a few minutes. No costly furnace shutdowns nor high labor and material cost for tube changes.



. . . IN THE ELECTRIC FURNACE

NEW LINDBERG CORRTHERM ELEMENT

CORRTHERM, Lindberg's radically advanced new electric heating element offers advantages never before available for heat treating furnaces. With this new element carburizing and carbonitriding with electricity becomes practical, efficient and economical. Ideal, too, in other types of Lindberg electric furnaces.

The outstanding feature of the CORRTHERM element is the extremely low voltage at which it operates. Consequently, leakage through carbon saturation and shock or short hazards are eliminated. Elements also act as baffles to direct circulation of convection streams.

CORRTHERM elements are practically indestructible. Work load or operator's charging tool can't hurt them. Watts density is at all time low. Easily installed or replaced, too, as element merely hangs in furnace and no complicated mountings are required.

Lindberg Field representatives in 21 cities are ready to show you how Lindberg furnaces with these revolutionary new elements can improve your heat treating process. You'll find your Lindberg representative's name in the classified section of the phone book or write us direct.

LINDBERG FURNACES

LINDBERG ENGINEERING COMPANY

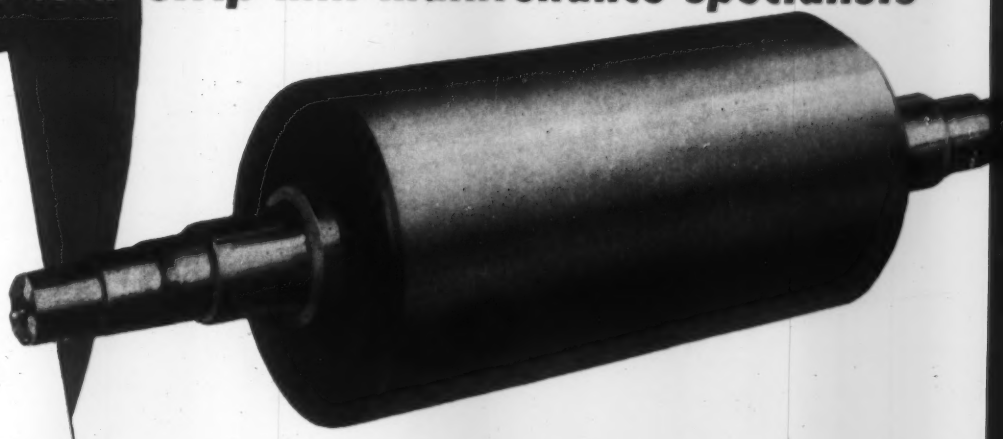
2441 W. Hubbard Street • Chicago 12, Illinois

Get the right answers to your Roll problems from "YOUNGSTOWN"

hot and cold strip mill maintenance specialists

Q. How can scratching, galling, pickup, and excess wear be eliminated?

A. Use PARALLOY... the Rolls of uniform hardness all through. Roll more tonnage from new to scrap diameter.



PARALLOY

HOT STRIP COILER ROLLS • COILER PINCH ROLLS
PICKLING LINE PINCH ROLLS • UPCOILER ROLLS
CLEANING LINE PINCH ROLLS • SINKER ROLLS
CARRIER ROLLS • TEMPER MILL TENSION ROLLS

Q. How can heat check, warpage and cracking be overcome?

A. Let Youngstown's proven experience with Ductile Cast Iron help you in the applications at right.

DUCTILE IRON

RUNOUT TABLE ROLLS • HOLDING TABLE ROLLS
LOOPER TABLE ROLLS
LOOPER TABLES • APRON PLATES

Ductile Cast Iron Rolls are reducing maintenance in hot strip mills . . . especially good under the sprays. We invite your inquiries on rolls or any other ductile iron castings up to 50,000 pounds.

The Youngstown Foundry & Machine Co.

SERVING INDUSTRY SINCE 1899

Youngstown, Ohio

. . . "*Positive Duplication—offered* ONLY *by* CINCINNATI (PD)° GRINDING WHEELS—*is a remarkable achievement in precision manufacturing and quality control!*"

And no wonder everybody's shouting the praises of CINCINNATI (PD) WHEELS. *You can save money . . . and increase your production . . .* when (PD) WHEELS are on the job. For through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS are priced no higher than ordinary wheels.

For complete details, see your CINCINNATI (PD) Grinding Wheels distributor, or contact us direct. We'll be happy to send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Telephone (or wire or write) Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . . (PD) POSITIVE DUPLICATION

CINCINNATI°
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF
THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.

CALENDAR
OF MEETINGS

Sept. 24-25, Steel Founders' Society of America: Fall meeting, Greenbrier, White Sulphur Springs, W. Va. Society's address: 606 Terminal Tower, Cleveland 13, O. Executive vice president: F. Kermit Donaldson.

Sept. 24-28, Trade Fair of the Atomic Industry: Navy Pier, Chicago. Information: Trade Fair Department, Atomic Industrial Forum, 260 Madison Ave., New York 16, N. Y.

Sept. 25-28, Association of Iron & Steel Engineers: Annual meeting and exhibit, Public Auditorium, Cleveland. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Sept. 27-28, Radio-Electronics-Television Manufacturers Association: Fall meeting, Homestead, Hot Springs, Va. Association's address: 777 14th St. N.W., Washington 5, D. C. Secretary: James D. Secrest.

Sept. 27-29, National Association of Foremen: Annual meeting, Jefferson hotel, St. Louis. Association's address: 321 W. First St., Dayton 2, O. Secretary: Mrs. Jean B. Adams.

Sept. 30-Oct. 4, Electrochemical Society Inc.: Fall meeting, Statler hotel, Cleveland. Society's address: 216 W. 102nd St., New York 25, N. Y. Secretary: Henry B. Linford.

Oct. 1-3, National Electronics Conference Inc.: Annual meeting and exhibit, Sherman hotel, Chicago. Conference's address: 84 E. Randolph St., Chicago 1, Ill. Executive secretary: John S. Powers.

Oct. 1-4, American Mining Congress: Metal mining and industrial minerals convention and exposition, Shrine Auditorium and Exposition Hall, Los Angeles. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president and secretary: Julian D. Conover.

Oct. 1-5, American Institute of Electrical Engineers: Fall general meeting, Morrison hotel, Chicago. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Oct. 2-4, Air Moving & Conditioning Association Inc.: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: 2159 Guardian Bldg., Detroit 26, Mich. Executive vice president: L. O. Monroe.

Oct. 2-6, Society of Automotive Engineers Inc.: National aeronautic meeting, aircraft production forum and aircraft engineering display, Hotel Statler, Los Angeles, Calif. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Oct. 4-5, Magnesium Association: Annual meeting, Drake hotel, Chicago. Association's address: 122 E. 42nd St., New York 17, N. Y. Secretary: Jerry Singleton.

Oct. 8-10, American Society of Mechanical Engineers: Lubrication conference, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Oct. 8-10, Institute of Metals Division, American Institute of Mining, Metallurgical & Petroleum Engineers Inc.: Fall meeting, Hotel Carter Cleveland. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

Oct. 8-12, American Society for Metals: Annual meeting, Hotel Statler, Cleveland. Society's address: 7301 Euclid Ave., Cleveland 3, O. Secretary: W. H. Eisenman.

Oct. 8-12, American Welding Society Inc.: National fall technical meeting, Cleveland hotel, Cleveland. Society's address: 33 W. 39th St., New York 18, N. Y.

Here's a brand-new

"2-in-1"

BUCKEYE ABRASIVE TOOL!

handles like an angle...

runs like a vertical...

for 4", 5", 6" cup wheels
for 5", 7", 9" sanding pads

AND, IT'S QUIET!

Take hold of this newest Buckeye abrasive tool . . . it has the feel and balance, and the ease of handling you expect only in an angle tool. And—it has the gearless efficiency and direct air flow of a vertical tool.

Now, turn it on. That handy twin-trigger throttle gives you pin-point control of the air flow from zero right on up to top speed. Notice how quietly it runs? That's the built-in muffler doing its job. The exhaust deflector, underneath, can be adjusted to any angle you choose.

This NEW Buckeye abrasive tool is available in five speeds, comes complete with dead handle and guard. If you'd like more information, just write—now—for our Catalog A-10. If you'd like to see what this new tool can do on your work, just tell us so and we'll make the necessary arrangements—without obligating you at all.

Buckeye Tools CORPORATION
DIVISION 12 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

VERSATILE

MILL-M-MATIC for Accurate, Heavy Duty Production Milling . . . .

. . . for EFFICIENCY

All machine functions within easy reach. All-electric, automatic controls built to conform with J. I. C. standards.

. . . for POWER

25 Hp. Anti-Friction Spindle Drive

Heavy duty milling head driven by large bull gear through involute spline. Extra wide bearing surface in housing when quill is fully extended.

. . . for QUICK, QUIET OPERATION

Hardened, ground gearing. Helical change gears for quick speed selections. Automatic spindle stop. 2-way automatic table cycles.

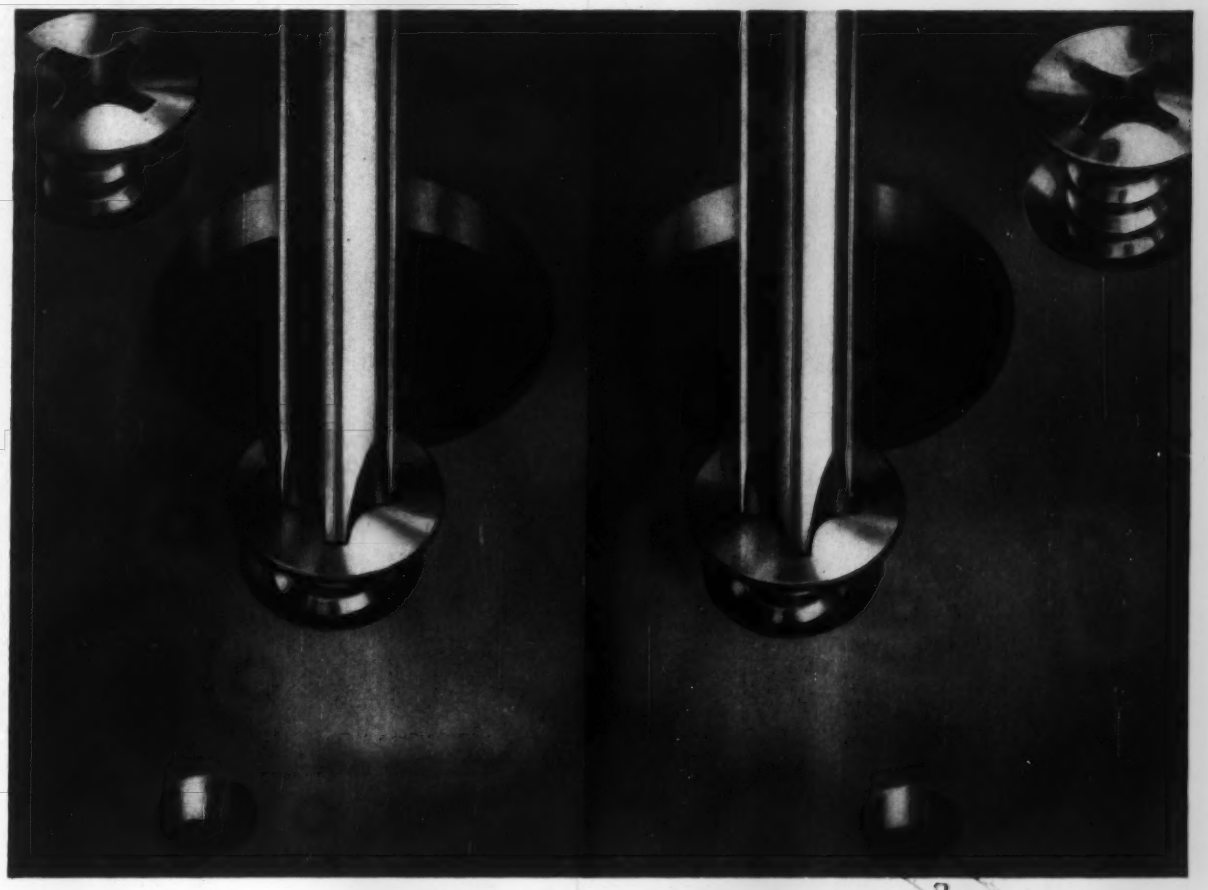
All the features of Mill-M-Matic point up to high, accurate production.

A fresh approach employing control by electric-mechanical powered action opens new possibilities in long life and precision operation in the field of *production milling*. Our 10-page bulletin describes all the advantages found in Mill-M-Matic.

THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION
CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines



They may Look the same but...

American is the name!

Your true cost of modern fasteners consists of four factors:

1. price **3. quality**
2. service **4. research**

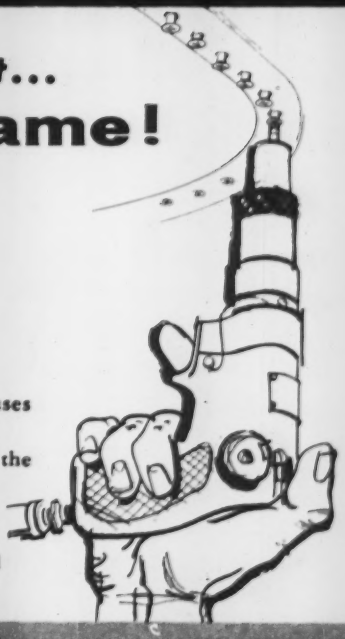
Sometimes there are local price differentials for the moment. But no one gives you more of all four than American.

American Gives You More of All Four

. . . *in service*, where American's controlled servicing meets any production schedule . . . a furniture manufacturer, for instance, uses more than 7 million American Phillips fasteners a year.

. . . *in quality*, where American's quality standards are highest in the industry to assure conformance of every product run.

. . . *in research* that has developed not only the original Phillips Head fastener but saved an aircraft manufacturer substantial sums by showing him how to change from a costly stainless steel fastener machined from bar stock to a sturdy cold-headed unit.



If this sounds unique in the industry, it is. For nowhere will you find more of the four basic features you want than from American Screw Company — price, service, quality, research.

Make your own comparisons . . . send us your inquiry for price and delivery or your specifications for special fasteners. Write:

American!

AMERICAN SCREW CO. • WILLIMANTIC, CONN.
NORRISTOWN, PA. • CHICAGO, ILL. • DETROIT, MICHIGAN

How one advertiser uses S. I. C.

to improve his market coverage

Getting economical and effective market coverage is no cinch when you have 41 different product lines being sold to 110 different industries. Here's how Sales Promotion Manager, A. Richard Kilgore does it for Baldwin-Lima-Hamilton Corporation.

Since 1952, Mr. Kilgore has built his complete sales promotion plan around a market-by-market analysis of each product. Each Fall he and representatives from his agency meet with B-L-H's nine product managers. In these sessions each product's sales and potential are rated for every pertinent S.I.C. category.

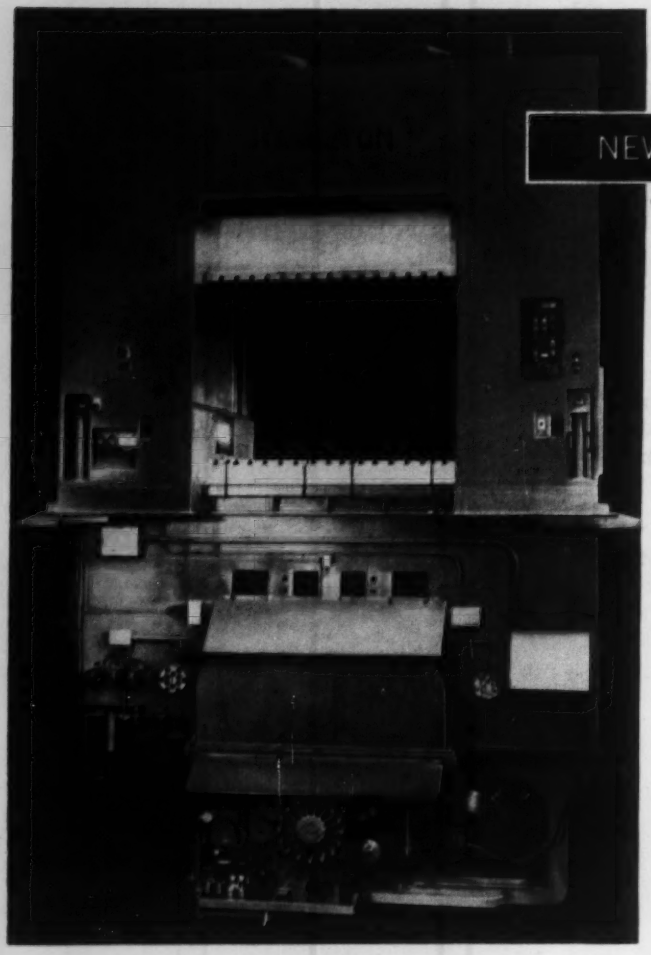
The resulting ratings are then recorded on a quadruple-gatefolded chart that's bound in the annual plan. On this chart each of B-L-H's 110 S.I.C. markets is weighted numerically in order of importance. Also each of the 41 product lines is rated to assure concentration of effort on the products with the best profit potential.

Mr. Kilgore says: "We've improved our market coverage measurably with our annual S.I.C. analyses of products and markets. In fact, they are indispensable for effective direction of our promotional efforts, on products that vary so widely in use and potential. We can compare our S.I.C. ratings with S.I.C. breakdowns of publication circulation, to make sure we get most economical market coverage."

Improvement of *your* market coverage is easy with Penton publications, because you can match your market objectives with S.I.C. breakdowns of publication circulations. It is one of the important extra values you get when you use a Penton publication.

the PENTON
Publishing Company

PENTON BUILDING • CLEVELAND 13, OHIO



NEWS FROM HAMILTON!

New 500-4000 ton underdrive draw press "package"...

for fast easy installation...
simplified maintenance...
smooth, safe drawing...
more productive strokes
per minute

Thirty years the leader in the mechanical press field, Hamilton now gives you this latest product of dynamic press know-how. An all-new line of 500 to 4000 ton mechanical draw presses engineered for fast, safe drawing operation . . . with each press a "package unit" for quick installation, easy maintenance.

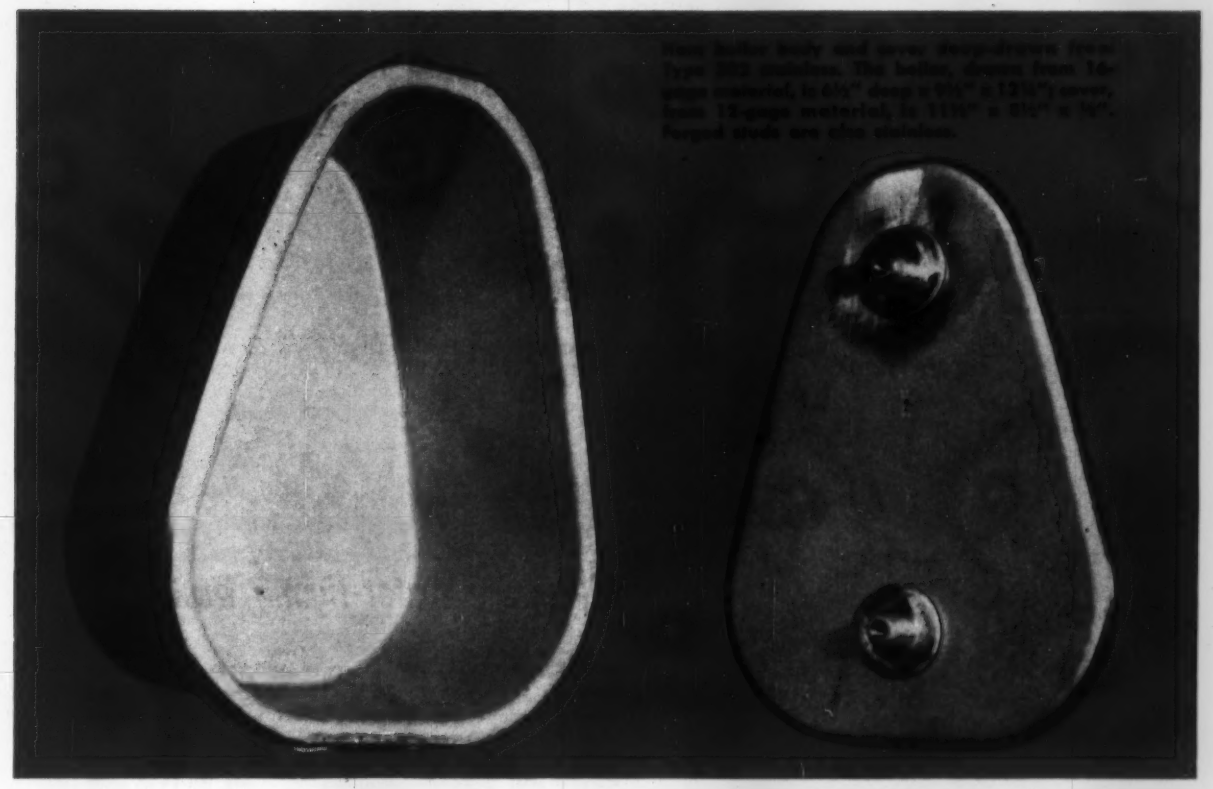
- *Package design* keeps all piping and wiring within the rugged, welded steel press structure. Installation is quick and easy.
- *Hamilton's Exclusive Double-Lube system* provides both pressure and gravity flow lubrication to all bearings.
- *Operating mechanism in the press bed* simplifies inspection and maintenance during operations.
- *Variable cycle sequences* insure more productive strokes per minute.
- *Swivel arrangement of counterbalance cylinders* insures proper alignment when gibs are adjusted.

You'll speed your production while you slash installation and operating costs . . . with these new Hamilton underdrive presses in your shop. They're designed and built to handle your toughest jobs better, faster—with far less downtime. Get the full story today! Write for complete specifications to Dept. 9677, Hamilton Division, BLH Corp., Hamilton, Ohio.

BALDWIN BLH LIMA-HAMILTON

HAMILTON DIVISION
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Eddystone • Hamilton • Electronics & Instrumentation • Lima • Madsen • Loewy-Hydropress • Pelton • Standard Steel Works



Pictured as is... to show you how T&W TECHNIQUE SAVES

Forging, weighing .284 lb., of 302 stainless steel, for stud shown above.

The illustration above shows a stainless steel ham boiler, consisting of two deep-drawn parts, plus two forged studs on the cover, all of which we make and assemble. This picture is unretouched. We left it *as is* because it tells so plainly how our technique produces a smooth, nearly-finished job, minimizing subsequent polishing operations. This saves the customer money.

This is just one part of *T & W Technique*, which also includes help for you in initial design, as well as scheduling our production and shipping precisely to your needs, so you obtain a product that usually costs you less at your point of final assembly. Send the coupon or your prints for estimating to learn more about how we can help you.

STAMPINGS
T&W
FORGINGS

TRANSUE & WILLIAMS

Over 50 years of experience

Sales Offices:

NEW YORK • PHILADELPHIA • CHICAGO • INDIANAPOLIS
DETROIT • CLEVELAND • HOUSTON • LOS ANGELES

TO: Transue and Williams, Alliance, Ohio

Please let me know what "T & W Technique" can do for us. We are interested in

☐ Forgings ☐ Stampings

Name _____

Company _____

Street _____

City _____ Zone _____ State _____

1303

T & W DEEP DRAWN STAMPINGS AND FORGINGS USUALLY COST LESS AT THE POINT OF ASSEMBLY

GOLD N RING

Units are available in flush-plate or enclosed mountings, and are adaptable for special panel assemblies.

New...

Oil-tight • Water-tight • Dust-tight

Protected against oil and water seepage by Sealtight oil-resistant rubber diaphragm. Rated for 600 volts, AC or DC. Meets requirements of Joint Industry Committee and National Machine Tool Builders' Association.

EASILY REPLACES EXISTING SWITCHES — Designed for mounting in $1\frac{13}{64}$" diameter holes on standard panel mounting centers, this switch easily replaces existing switches. Accommodates panel thicknesses of $\frac{1}{16}$" to $\frac{1}{4}$" in $\frac{1}{32}$" increments. Full interchangeability of units and their components permits ready adaptation to multiple assemblies.

Another product of...

National Acme

Sealtight CONTROL SWITCH

Made by machine tool builders to machine tool specifications

How often have you, when designing a machine tool, wished for a control station unit designed and constructed "*as a machine tool builder would build it.*"

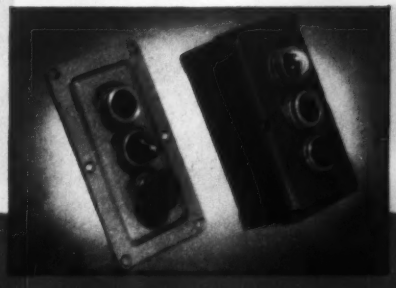
If you have been so handicapped in the past, you'll want to take a good close look at the NEW Namco GOLD-N-RING Control Station Switch Unit. Built by National Acme, builder of the world's only complete line of bar and chucking automatics, it is the *only* switch made *by* a machine tool builder *with machine tool know-how behind it.*

- **It is a heavy-duty switch in every respect.**
- **It is oil-tight, water-tight, dust-tight.**
- **Heavy-duty silver-alloy contact points provide maximum electrical capacity and long life.**
- **Heavy-duty terminal screws, with ⅜" thread contact, prevent stripping during installation and permanently secure wires for continuous trouble-free service.**
- **None easier to install; none more fool-proof.**

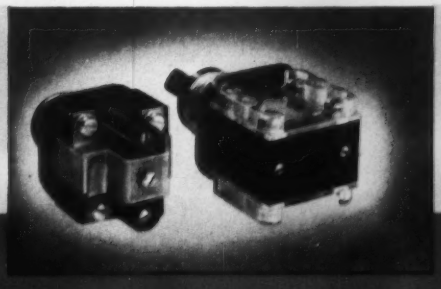
For complete details, send for Bulletin ECS-56. Better yet, ask for a representative to bring a switch for your examination.

Electrical Mfg. Division • THE NATIONAL ACME COMPANY • Cleveland 8, Ohio

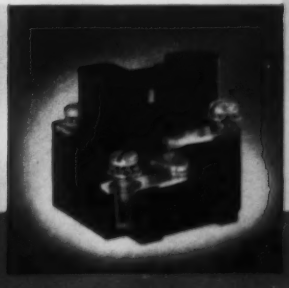
▼ **FLUSH PLATES OR ENCLOSURES accommodate any combination of individual push button, selector or pilot light assemblies. Box covers and flush plates are provided with captive screws to facilitate installation. Easy-to-read, interchangeable legend plates lock securely into position.**



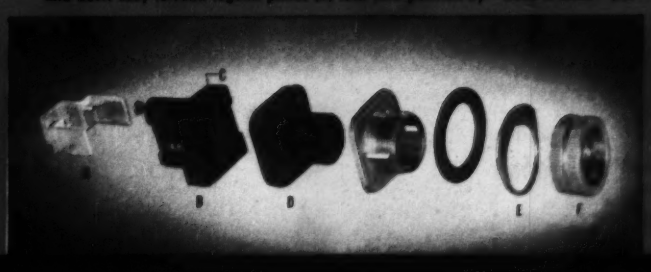
▼ **SINGLE AND DOUBLE POLE CONTACT BLOCKS can be used interchangeably with the several types of GOLD-N-RING push button and selector operator heads. Design provides easy access for secure wiring (or use of stake-on lugs) without interference. Fixed and movable contacts are completely enclosed by heavy plastic shields.**



▼ **BRASS INSERTS molded in block permanently hold stationary contacts. They also provide more thread support for the No. 8-32 terminal screws that are equipped with captive flat and lock type washers.**



▼ **BUILT AS A MACHINE TOOL BUILDER WOULD BUILD IT! Plastic shields (A) completely enclose contacts. Base block (B) is unit-molded to assure alignment and simplify assembly. Fully guided plunger (C) of cross-head design, prevents binding. Oil-resistant rubber diaphragm in operator head (D) completely seals out oil, water and dust. Easy-to-read legend plates (E) lock into position by "GOLD-N-RING" (F).**



▼ **INTERCHANGEABLE "GOLD-N-RING" COLLARS come in 2 different heights. Buttons can be made either extended or flush type merely by changing collar. Buttons are of non-fading glass-filled polyester and come in an assortment of colors to conform with standard codes.**

Ouija boards are passé

Time was, when a person had a question, out would come the ouija board for an answer. This wasn't too accurate a system, of course . . . but a lot of people put a lot of faith in what the ouija board told them.

Times change — and today accuracy is the keyword. That's why the modern business publication wants its circulation audited.

In joining BPA* the publisher is taking an important step toward sound and accurate planning in your behalf. It means that he is checking, double-checking and constantly rechecking —

- **Who you are**
- **Where you work**
- **What your job is**

He wants and needs this information — and the BPA* audit can assure both him and his advertisers that he is getting his magazine into the hands of people *qualified by their common interests* to receive it. It helps him to give you —

- **Editorials that will *help you in your work***
- **Advertising that will *have value to you***

He can serve you even better if you will complete surveys and questionnaires which he may send you, and if you will give him your thoughts and opinions on the editorials and advertisements in his magazine.

You, the reader, are the *key person* to the publisher — and the BPA* audit helps him in his never-ending effort to think about you and design his magazine for you.

You, the reader, benefit when the circulation of a publication is audited by . . .

***BUSINESS PUBLICATIONS AUDIT OF CIRCULATION, INC.**
420 Lexington Avenue New York 17, N. Y.

BPA

A Non-Profit, Tripartite Membership Corporation of Advertisers, Advertising Agencies and Business Publications

JOB-RATED Type "C" DISC

The sensational new 3M Type "C" Disc is stronger, sharper and longer-cutting than any other disc of its type on the market today. It's *shape-controlled* and *job-rated* (for edge sanding, flat sanding or solder sanding) to fit your specific operations. It's the top quality disc that eliminates problems of disc cupping and breaking—assures you highest consistent performance.

NEW... from 3M COMPANY Research

a portable metal grinding and finishing team

PORTABLE "PG" WHEEL

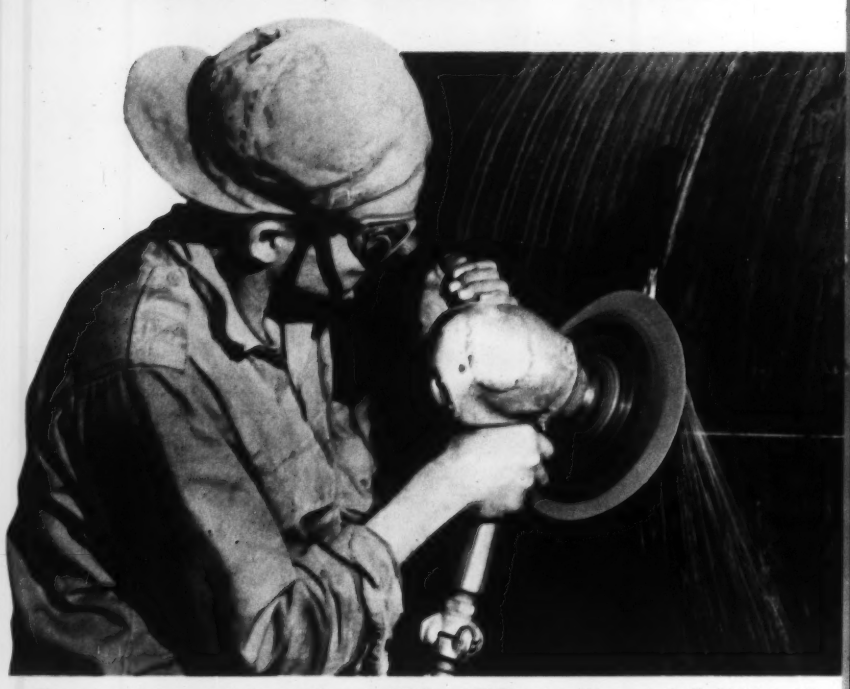
The amazing new portable "PG" Wheel is the finest, most revolutionary, metal-polishing tool available—designed to replace set-up wheels, felt wheels, rubber bonded polishing wheels, greaseless compound wheels. It's *self-conforming* to curves and contours . . . retains its shape *throughout* its working life . . . needs no breaking in or dressing. It cuts costs, increases production, improves finishes.

3M's NEW PORTABLE TEAM

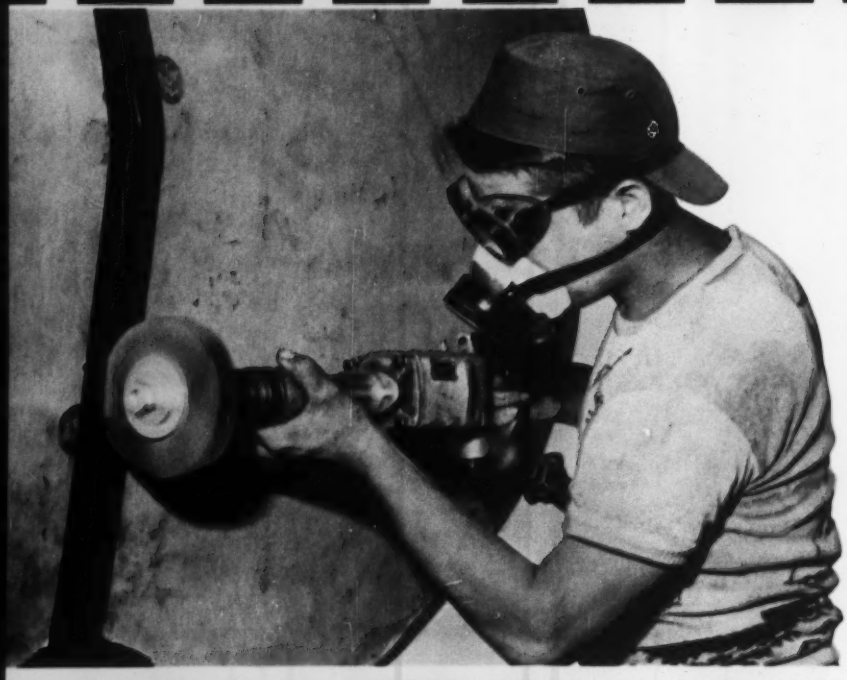
JOB-RATED
Type "C" Disc

SHAPE-CONTROLLED — amazing new treatment during manufacture gives new 3M Type "C" Discs the best resistance to effects of humidity and temperature of any disc in the world (see chart, overleaf).

JOB-RATED—new 3M Type "C" Discs are now job-rated for specific work . . . edge sanding . . . flat sanding . . . solder sanding or oil filling operations. This advance results from 3M's pre-eminent position in quality control. New controls on fibres—constant improvements in resins—are just two of the factors making it possible. Most important, in shape-controlling *and* job-rating is 3M's miraculous new coated abrasives making machine—the world's largest and most modern—which controls quality to a degree impossible to equal elsewhere.



Shown in picture above is the amazing new 3M Type "C" Disc at work on a hot-rolled high tensile steel transport tank at the Standard Steel Works, Kansas City, Missouri. Here, a test was conducted on weld grinding performance of the new "C" Disc, Grit #36 vs. performance of a standard "C" Disc, Grit #36. Results: the new 3M Type "C" Disc removed stock 25% faster—lasted 10%-15% longer.



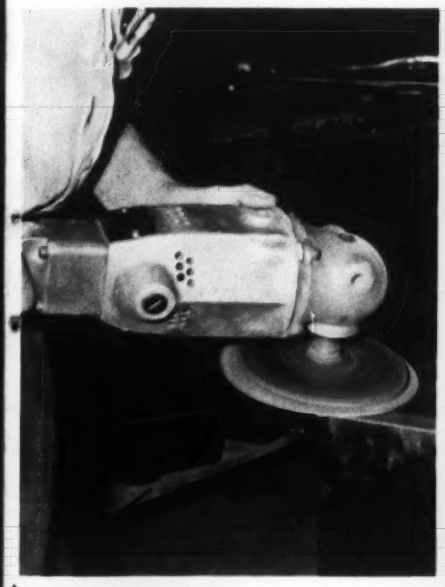
Shown above, the remarkable new portable "PG" Wheel is blending a weld on a stainless steel dairy tank at the Standard Steel Works, Kansas City, Missouri. Here the weld is to be blended with a #4 finish on the tank (shown covered by a protective tape). Formerly, this manufacturer was using set-up wheels for this operation—found them slow, unsatisfactory. The portable "PG" Wheel increased production—did a better blending job than was ever before possible.

PORTABLE
"PG" WHEEL

PORTABLE—this smaller version of the standard "PG" Wheel is a remarkable new metal-polishing tool, ideally suited for both portable and bench grinding machines. Formed of die-cut segments of cloth-backed 3M Coated Abrasive, bonded with resin and locked into a hub.

SELF-CONFORMING—the new portable "PG" Wheel makes filling a problem of the past because its coated abrasive cannot become filled. The mineral grains *and* backing wear away together—conforming to the shape being polished—and presenting an always new surface to the work. The portable "PG" Wheel is perfect for rust or dirt removal, blending disc-sander patterns, weld polishing, metal-feather edging *and* soft-metal polishing, tar-grinding or removing runs and sags on fibre glass.

obsoletes other metal grinding and finishing methods with far greater speed and savings like these ▼ ▼ ▼



EDGE SANDING welded corners of steel cabinet units with the *new* 3M Type "C" Disc. The Underwood Company, Pittsburgh, Pennsylvania, finds that Grit #60 "C" Discs provide fast cut-down of excess weld metal, leave moderate scratch pattern for easy matching to a standard #4 finish on the unit.

FLAT SANDING welds on steel refrigerator cabinets with *new* 3M Type "C" Disc at Midwest Manufacturing Corp., subsidiary of Admiral Corp. Manufacturer finds *new* "C" discs tailor-made for his moving line operation —finds too, that down-time for disc-changing is cut to a minimum.

SOLDER SANDING and weld grinding on various areas of assembled funeral caskets. The Cincinnati Coffin Company, Cincinnati, Ohio has found that the new job-rated "C" Discs cut faster—fill less—and last up to 50% longer than the discs they had previously used for these operations.

FLEXIBLE SHAFT refinishing of used aluminum aircraft propeller blades with a portable "PG" Wheel. American Airmotive Corp., Miami, Florida finds the "PG" Wheel ideal for restoring blade finish. The "PG" Wheel outlasts the set-up wheels previously used by a ratio of 20 to 1—*and* works faster.

FIXTURE-HELD FLEXIBLE SHAFT blending of inside diameter of steel turbine center with a Grit #120 portable "PG" Wheel. Twin Disc Clutch Co., of Rockford, Illinois, found the new "PG" Wheel ideal for this operation as it conforms itself to follow the contour of the turbine center —performs the blending operation in one pass.

BENCH GRINDER polishing of farm machine part with a Grit #150 portable "PG" Wheel. Minneapolis Moline Co., Minneapolis, Minn., had difficulty removing sharp edges—parts' shape made set-up wheel or belt polishing hard. "PG" Wheel cuts, polishes in 1 operation *and* conforms to forgings' small radius.

In the above pictures, protective guards have been removed for photographic purposes

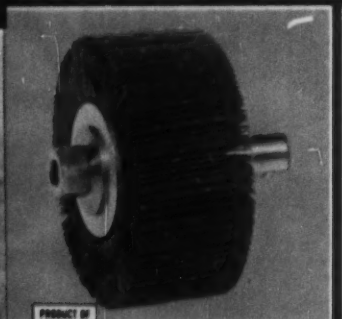
SPECIFICATIONS

Job-rated, shape-controlled 3M type "C" DISC

PRODUCT OF 3M RESEARCH

	15% relative humidity	45% relative humidity	60% relative humidity
OLD Type Discs	5.0	2.0	1.8
NEW 3M Type "C" Discs	2.5	0.5	0.0

3M Portable "PG" WHEEL



PRODUCT OF 3M RESEARCH

Wheel Diameter	Grits	Width	Recommended Speed—RPM
6"	50 thru 320	1-1½-2-2½-3	5,000
7"	"	"	4,500
8"	"	"	4,000
9"	"	"	3,500
10"	"	"	3,000
11"	"	2-2½-3	3,000

3M ABRASIVES

Made in U.S.A. by MINNESOTA MINING AND MFG. CO., General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City. Makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

3M

MINNESOTA MINING AND MANUFACTURING CO.
Dept. AK-96, St. Paul 6, Minn.

- ☐ Rush me full facts on the new job-rated, shape-controlled "C" Disc
- ☐ Rush me full facts on the new portable "PG" Wheel
- ☐ Please have a 3M Representative call

NAME.....

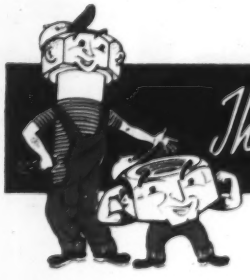
COMPANY.....

ADDRESS.....

CITY.....ZONE...STATE.....

Don't call NAMES—
Call "ELL" & "ESS"!

Down, boys, down. There's a better way to settle that difference of opinion.
Call "Ell" & "Ess"—Lamson & Sessions, to you—and we'll tell you
the best, most economical way to solve that fastener problem.
When it comes to bolts and nuts, we've got the answers. Our
files are bursting with "how to fasten it" data . . . and
we're bursting to share it with you.
So before you get hot under the collar, get hot on the phone . . .
and call in those helpful fastener fellows "Ell" & "Ess".
It will save time, trouble and tempers!
And remember, there's no charge for "Ell" & "Ess" service. It's yours for the asking.



The LAMSON & SESSIONS Co.

1971 West 85th Street · Cleveland 2, Ohio
PLANTS AT CLEVELAND AND KENT, OHIO · BIRMINGHAM · CHICAGO

Republic Electro Paintlok® doubles

ONLY ONE COAT OF PAINT on Republic Electro Paintlok, results in a handsome, durable finish for these Temprite water coolers. In addition, Republic ENDURO® Stainless Steel is used for fountain tops to provide life-time beauty and sanitation.

SEVERE FORMING AND BENDING are shrugged off by chemically treated, electro plated zinc surface of Electro Paintlok. In fact, the phosphate coating itself acts as a lubricant for certain forming operations. Send coupon for full details.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

production of existing facilities

By using Republic Electro Paintlok instead of cold rolled sheet steel for their water cooler housings, Temprite Products Corporation of Birmingham, Michigan, actually double the output of their painting and drying facilities. How? Because only one coat of paint is used on these parts when fabricated from Electro Paintlok, and one pass through the drying oven is sufficient to produce a high-quality, long-lasting finish.

In contrast with this, uncoated sheets for this application required a prime coat before final painting. Temprite found, through experience, that the labor and material cost of the primer coat exceeded the extra cost of Electro Paintlok. Even more important, at today's level of demand *they could not maintain required volume of production when both a primer and final coat of paint had to be applied and dried.*

As a result, Temprite has standardized on Republic Electro Paintlok. And in addition to cost and time savings, they secure a higher quality finish as well. Even when scratched through, Electro Paintlok's chemically treated zinc surface continues to retard corrosion and effectively limits it to the point of original damage.

Add all of these advantages to the fact that Electro Paintlok is delivered from the mill in prime condition for painting and will not rust under approved warehousing conditions . . . and you can see why it will pay you to investigate its use wherever you have a paint adherence problem. Simply contact your Republic representative or mail the coupon for full information.

BUILT-IN SALES APPEAL for the Temprite Club Bar, four-beverage dispenser, is secured through the use of ENDURO Stainless Steel for all housing components. The lustrous beauty of ENDURO harmonizes with any surroundings . . . stays bright and sanitary indefinitely without laborious polishing. Republic makes all analyses of stainless to meet every application. Coupon will bring full information by return mail.

PRODUCTION PROBLEMS VANISH when you specify Republic Steel Sheets. Whatever your requirements, your Republic representative or steel distributor can help you select the ideal type of sheet. He is backed by a broad selection including hot rolled, cold rolled, galvanized, Galvannealed, Electro Paintlok, Electro Zincbond®, Electro Flashcote and other types in a wide variety of analyses.

END PRODUCTION BOTTLENECKS by sending your sheet steel fabricating problems to Republic's Berger Division. You get the benefit of complete contract fabricating facilities, plus a wealth of experience, designed to form high-quality sheet steel into products or components of your own design, economically. Investigate this means of cutting tooling costs and plant additions. Mail the coupon for further data, today.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
3120 East 45th Street, Cleveland 27, Ohio

Please send me further information on:

- ☐ Republic Electro Paintlok
- ☐ Republic ENDURO Stainless Steel
- ☐ Berger Division Contract Manufacturing Facilities
- ☐ Republic Sheet Steel (specify)_____

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

C-1084

IDEAS!

National Metal Exposition And Congress

October 8 thru 12

PUBLIC HALL
CLEVELAND, OHIO

More than 100, idea-packed technical papers will be presented by experts.

You'll learn cost-cutting ideas for every phase of metals thinking from product design to product test. You'll see all the modern ideas in heat treating, fabricating, cleaning, finishing, machining, foundry, forging, testing, welding, inspection.

You and the management, engineering, production and purchasing men you work with will earn and learn much more than the cost of your visit to this great Metal Show. It will be just like touring 300 plants in the metal industry, which would otherwise take months of your time.

Plan now to attend with a team from your plant. The hundreds of profitable product and technical ideas you and your associates will take home will be just what you need in your future planning.

AMERICAN SOCIETY FOR METALS \ 7301 EUCLID AVENUE · CLEVELAND 3, OHIO

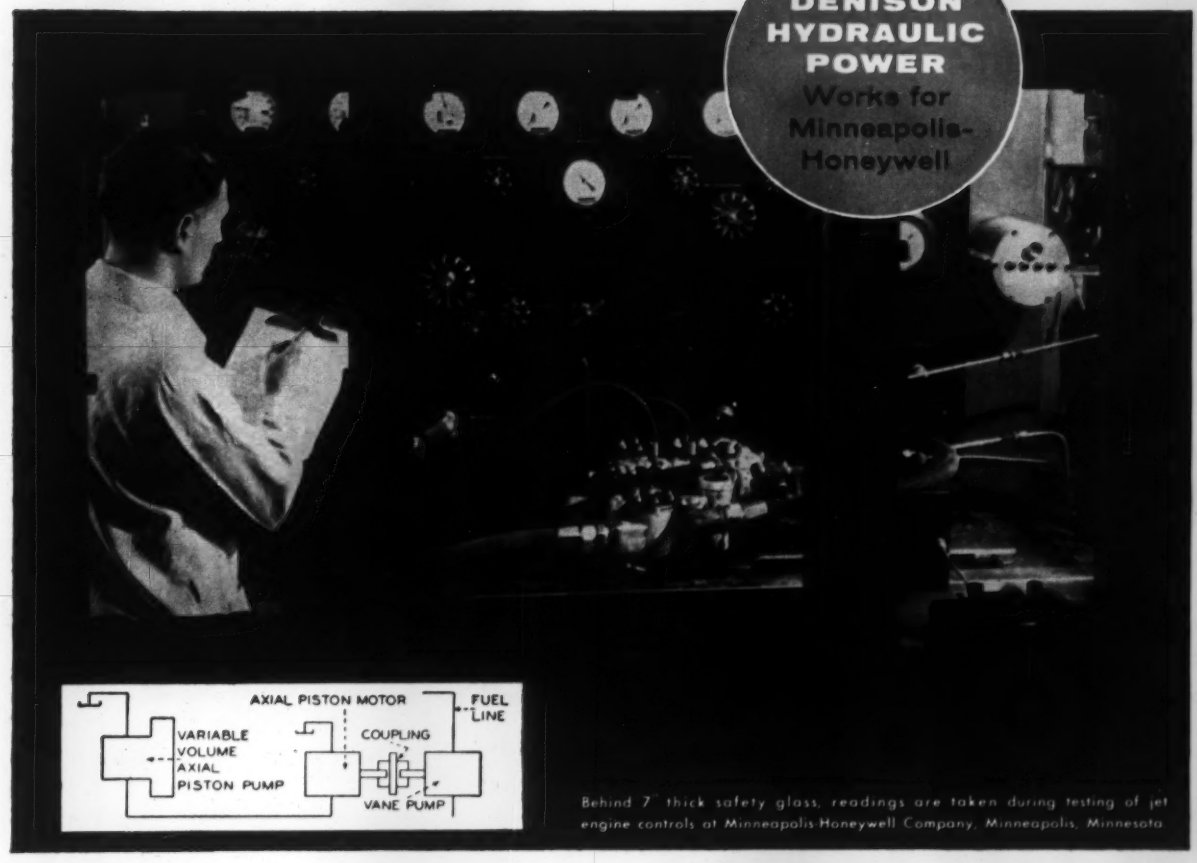
OWNERS AND MANAGERS

National Metal Congress
National Metal Exposition
Western Metal Congress
Western Metal Exposition
Metals Engineering Institute
Metallurgical Seminar Institute

PUBLISHERS

Metal Progress
Metals Review
Metals Handbook
ASM Transactions
Metal Showmen
Technical Books

How **DENISON HYDRAULIC POWER** Works for Minneapolis-Honeywell



Behind 7" thick safety glass, readings are taken during testing of jet engine controls at Minneapolis-Honeywell Company, Minneapolis, Minnesota.

Providing the muscle power for a "ghost" engine

Denison Variable Volume Axial Piston Pump remote controlled.

A unique electronic system developed by Minneapolis-Honeywell to pre-test jet engine controls now eliminates the cost of building and operating a special engine test cell. The system actually produces a more accurate record of performance than would be possible if the actual engine were used.

The system works this way. An analog computer takes the place of the jet engine. Performance data and other characteristics are received from the manufacturer. These are then simulated on the computer and reproduced as electrical signals, which, in turn, run the engine controls.

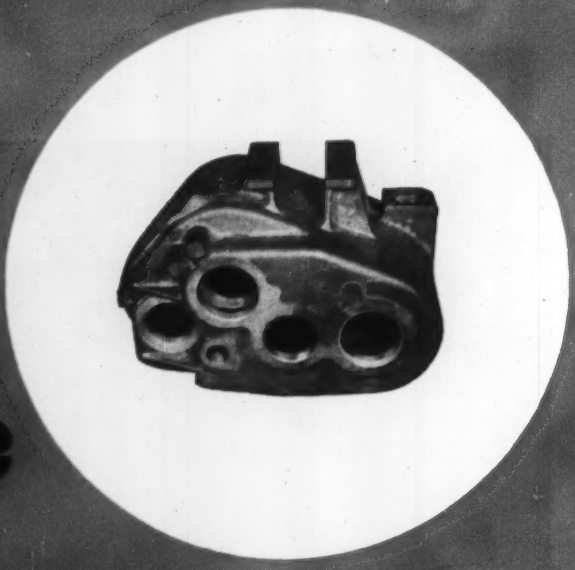
To provide dependable muscle power for this control system, Minneapolis-Honeywell relies on Denison hydraulic pumps and motors. The key unit, a Denison Variable-Volume Axial Piston Pump is the prime mover for a Denison axial piston motor that in turn powers a Denison vane pump to deliver jet fuel.

Denison hydraulic equipment is today serving all industries by cutting operating costs, speeding production, and improving reliability. Let a Denison field engineer show you how you can benefit from Denison's hydraulic experience. Write Denison Engineering Division, American Brake Shoe Co., 1180 Dublin Road, Columbus 16, Ohio.

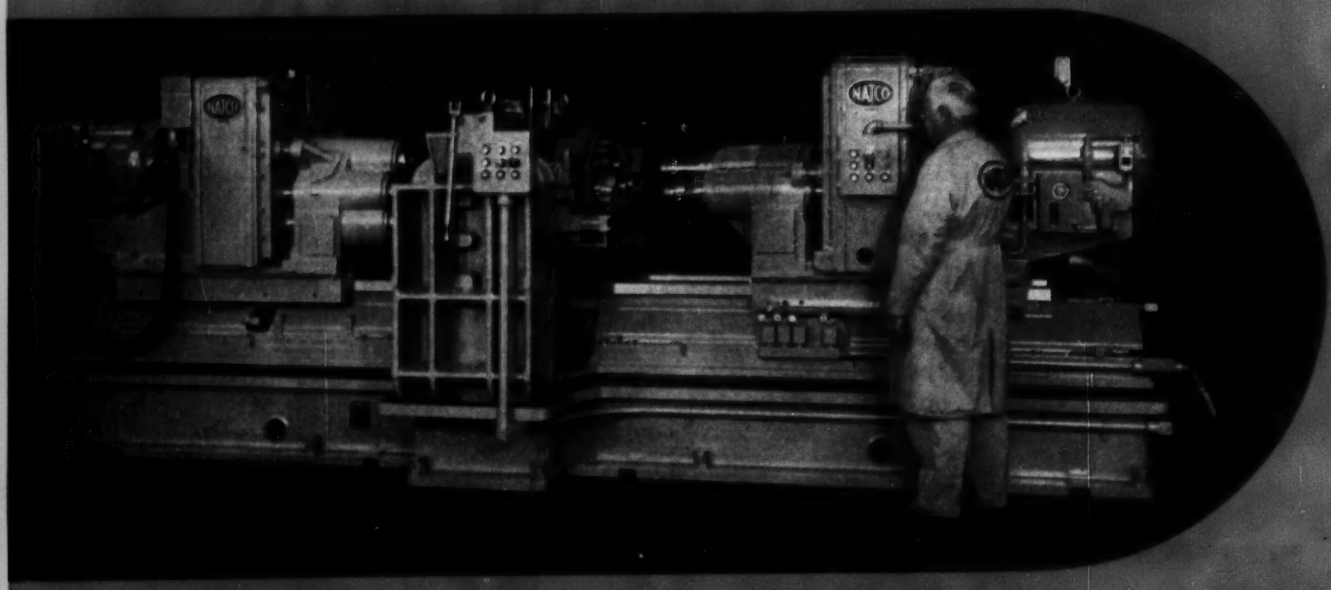
HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS

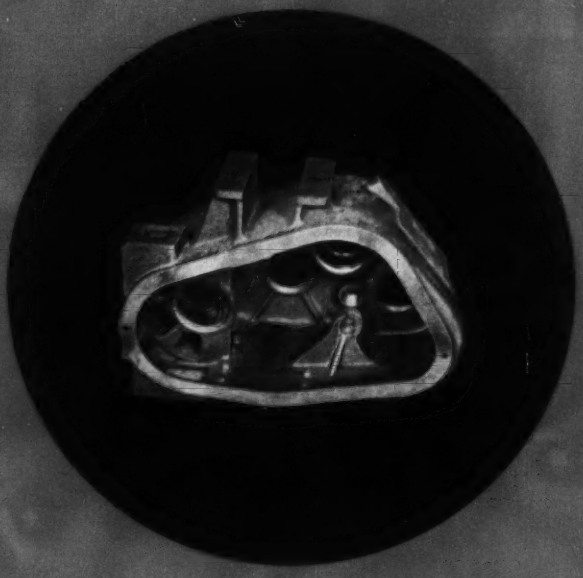
DENISON HydrOILics

Natco® Automatic Matches Boring Mill Accuracy



and quickly converts for five different jobs





This Natco two-way machine stepped in where automatics "fear to tread!" It replaced a precision boring mill, speeded production and didn't give up a tenth in accuracy! At The Frank G. Hough Co. boring mills were used for exacting tolerances on transmission parts for the Hough Payloader®. Higher production was desired.

Now with a Natco two-way automatic, Hough is getting production rates—not job shop rates. The Natco bores diameters to within .0005"—square with mounting face within .0005" per inch bore length. The machine also chamfers, counterbores and notches boss contours.

Versatile too! Hough processes five different transmission housings or covers with a single machine. After a typical production run averaging 100 parts, the machine is quickly converted to another job.

Ask for information about the PAYD (Pay-As-You-Depreciate) Finance Plan.

Currently 86% of Natco's shipments are on or ahead of schedule.

National Automatic Tool Company, Inc. *Richmond, Indiana*

Multiple-spindle drilling, boring, facing and tapping machines. Special machines for automatic production.

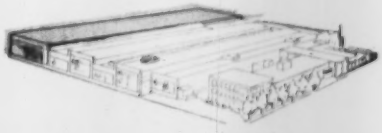
Call Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.

NATCO

Notes from Natco...

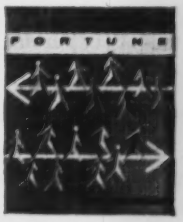
Middle Age Spread

Having reached the age of 55 feeling as spry as the day we started, we at Natco are going to spread out. The demand for our products makes this necessary since we're anxious to give our customers the kind of deliveries they need.



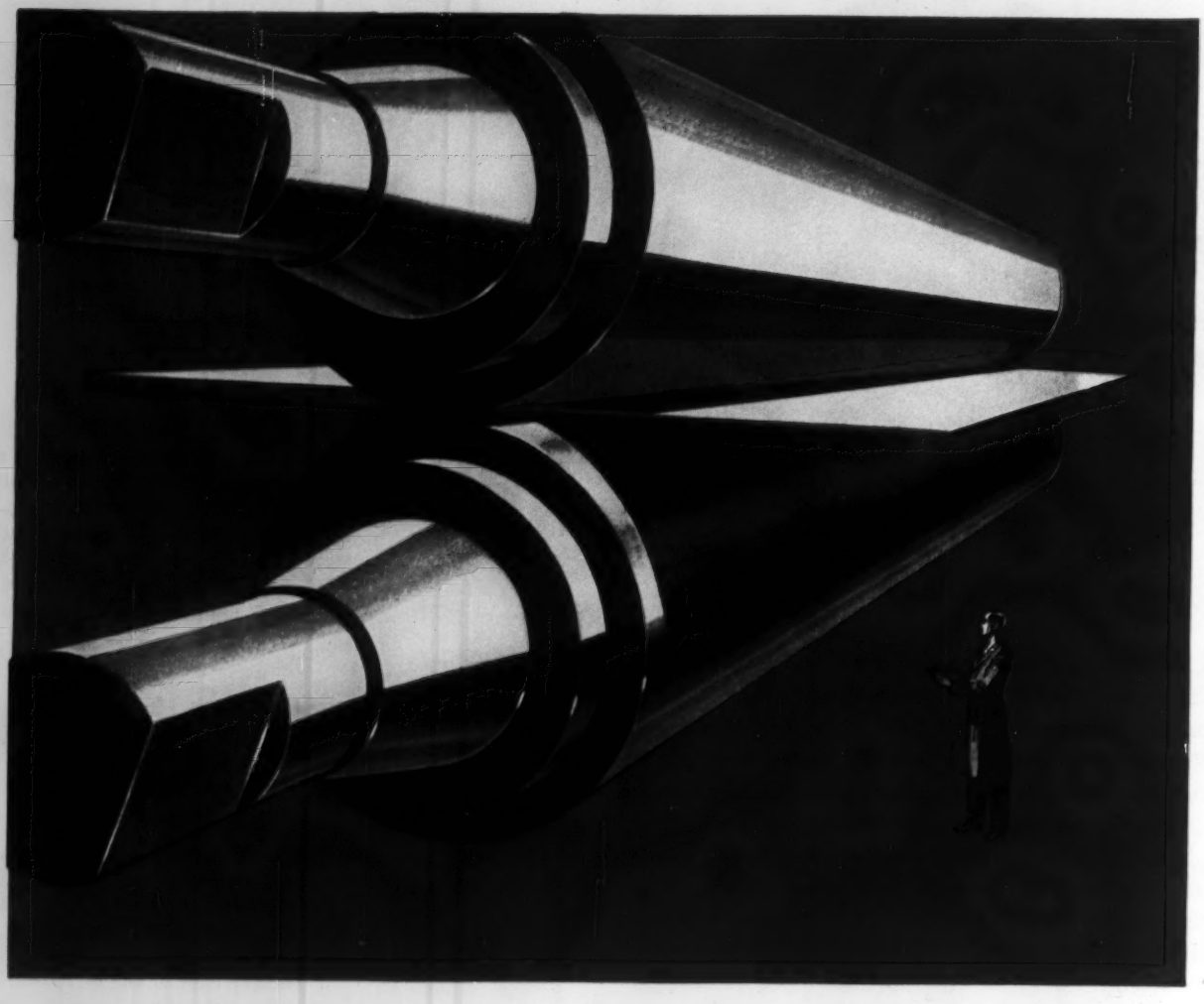
After Jan. 1, 1957, when the job is finished, we'll have eight acres under one roof at our Richmond, Indiana plant. We figure it will increase our production capacity about 50%.

To take care of the increased need for Sales Service, we've already increased our staff about 50% and provided them with new efficient quarters.



Appreciating Depreciation

Depreciation, we've come to realize, is one of the least understood and most important aspects of the business picture today. Though we're far from experts on the ins and outs of this complex subject, we've undertaken to discuss the importance of looking at depreciation realistically in our current FORTUNE campaign. We'll be happy to send you reprints if you'll drop us a line.



THE MAN WITH EXPERIENCE IN INDUSTRIAL LUBRICATION

Here's a man with experience, where experience counts, on-the-job experience in heavy industrial lubrication.

He's a man who is typical of Atlantic service. Selected to represent Atlantic because he *is* a specialist. And he's backed by other Atlantic specialists in lubrication research, production, quality control and transportation.

Atlantic has served customers successfully for 85 years because Atlantic has developed the products necessary to do the lubrication job right at the lowest cost to the lubricant consumer.

Why not benefit by this combination of correct lubricants and technical service? Simply write, wire or phone the Atlantic office nearest you for full information on Atlantic lubricants. The Atlantic Refining Company, Dept. S-9, 260 South Broad Street, Philadelphia 1, Pa.

PROVIDENCE, R. I.
430 Hospital Trust Building

SYRACUSE, N. Y.
Salina and Genesee Sts.

READING, PA.
First and Penn Aves.

PITTSBURGH, PA.
Chamber of Commerce Building

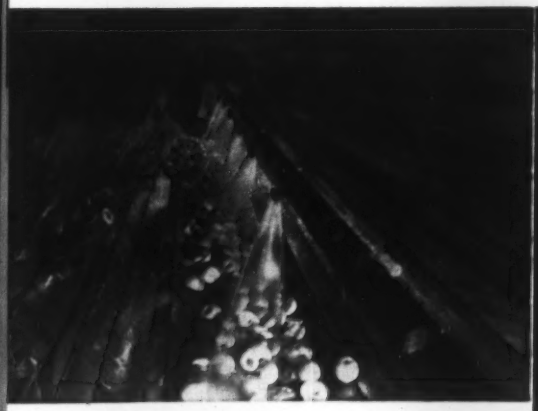
ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

FOR SCUFF-RESISTANT BEAUTY. This Sunroc water cooler has, as standard equipment, a Stainless Steel kick plate for protection against scuffing and corrosion when floors are mopped. The deep drawn top is also made from Stainless. It's bright and inviting, and easy to clean.

FOR LONG, HARD SERVICE. Some of the Stainless Steel tubes in this bundle are 20 years old, despite the fact that they have been in continual service in a thermal cracking unit at a major southwestern oil refinery. Even though some of them have been lengthened by heliarc welding, they still retain their ability to handle corrosive products.

NOTHING *can equal* *Stainless Steel*



FOR SANITATION. This is a Stainless Steel rotary washer at a baby food plant of Gerber Products Company. Stainless Steel was used because of its great corrosion resistance, because it will not contaminate the food products, because it is so very easy to clean. Gerber's uses a lot of Stainless Steel processing equipment—including peelers, bins, steamers, holding tanks and filling machines.

• No other design material can match Stainless Steel in its *combination* of desirable properties: corrosion resistance, strength and hardness, beauty, cleanability and easy fabrication. When seeking a source of supply, remember that United States Steel offers the widest range of types, finishes and sizes available in the United States.

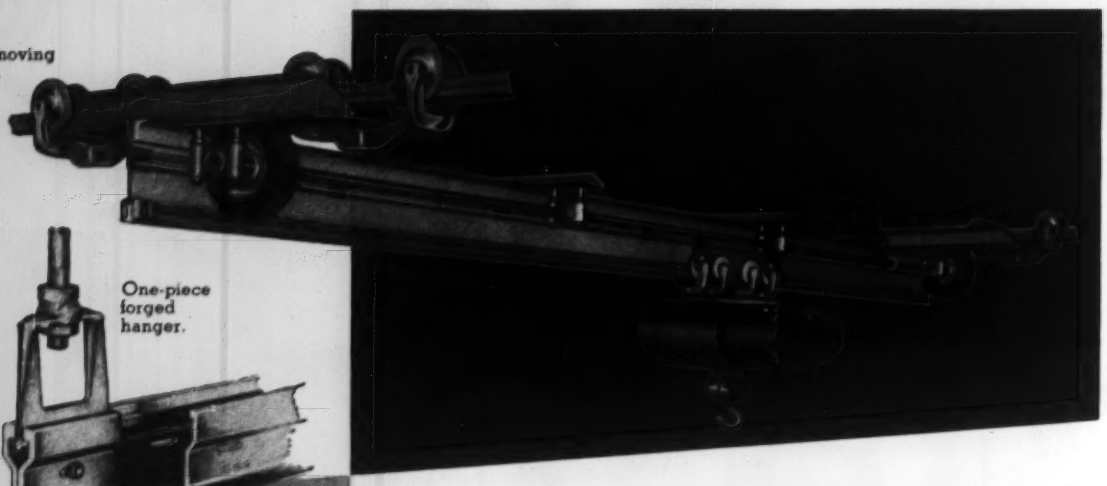
UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

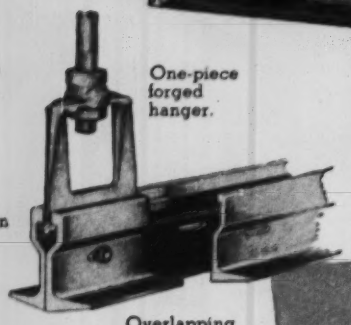
USS STAINLESS STEEL

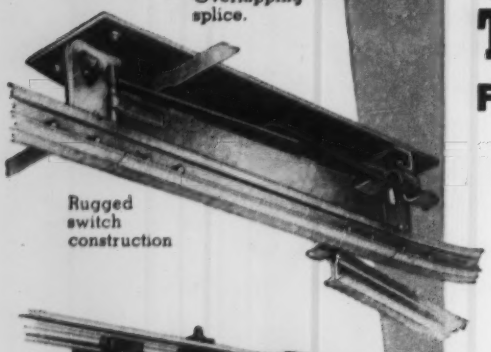
SHEETS · STRIP · PLATES · BARS · BILLETS
PIPE · TUBES · WIRE · SPECIAL SECTIONS

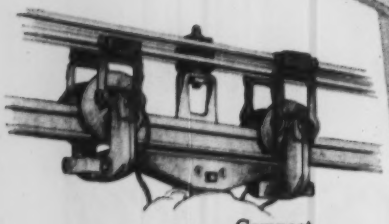
USS

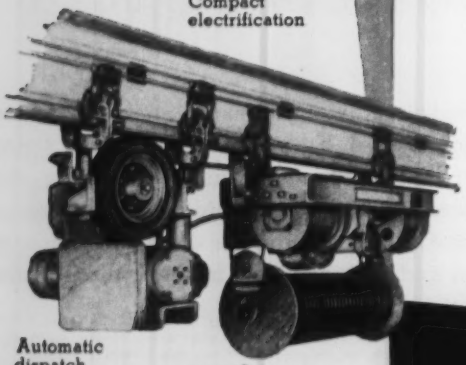
UNITED STATES STEEL











TAILOR-MADE SYSTEMS
FROM STANDARD PARTS

Standard American Monorail units offering the many advantages illustrated, are combined into systems for handling any type of unit loads.

These systems are available for manual, electric or automatic operation with local or remote control.

Experienced Monorail engineers will tailor-make a cost-saving handling system from standard parts to fit your specific needs.

Write today for Bulletin C-1.

Member of Materials Handling Institute - MonoRail Association

AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13102 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

RESEARCH
IS ALWAYS ON
• in fatigue life
• materials • new uses
• production methods
TO GIVE YOU THE
BEST IN SPRINGS
FIRST
WALLACE BARNES COMPANY
BRISTOL, CONNECTICUT
THE WILLIAM B. GIBSON COMPANY
1800 CLYBOURN AVE. CHICAGO 14
RAYMOND Manufacturing COMPANY
CORRY, PENNSYLVANIA
BARNES-GIBSON-RAYMOND
40300 PLYMOUTH RD. PLYMOUTH, MICH.
B-G-R COOK PLANT
ANN ARBOR MICHIGAN
DIVISIONS OF ASSOCIATED SPRING CORPORATION
COAST TO COAST
SEABOARD Coil Spring Div.
15001 S. BROADWAY GARDENA, CALIF.
OHIO DIVISION
1825 EAST FIRST ST. DAYTON, OHIO
WALLACE BARNES COMPANY
STATE FAIR BLVD. SYRACUSE 9 (Salina), N.Y.
MILWAUKEE DIVISION
341 E. ERIE ST. MILWAUKEE, WIS.
DUNBAR BROTHERS COMPANY
BRISTOL, CONN.
F. N. MANROSS AND SONS CO.
BRISTOL CONNECTICUT
THE WALLACE BARNES CO., LTD.
HAMILTON CANADA
Divisions of
ASSOCIATED SPRING CORPORATION

Ferrocolumbium

now...

a new source

The use of Columbium is now free of any restrictions and may be again employed as a valuable alloying material, recognized for improving high temperature properties and increasing corrosion resistance.

In announcing the addition of this product to its line of metallurgical alloying elements, the same reliable MCA technology is offered that has distinguished MCA molybdenum, tungsten, boron and rare earths . . . faithful uniformity in fulfilling specifications . . . deliveries to accurately anticipate customer's requirements.

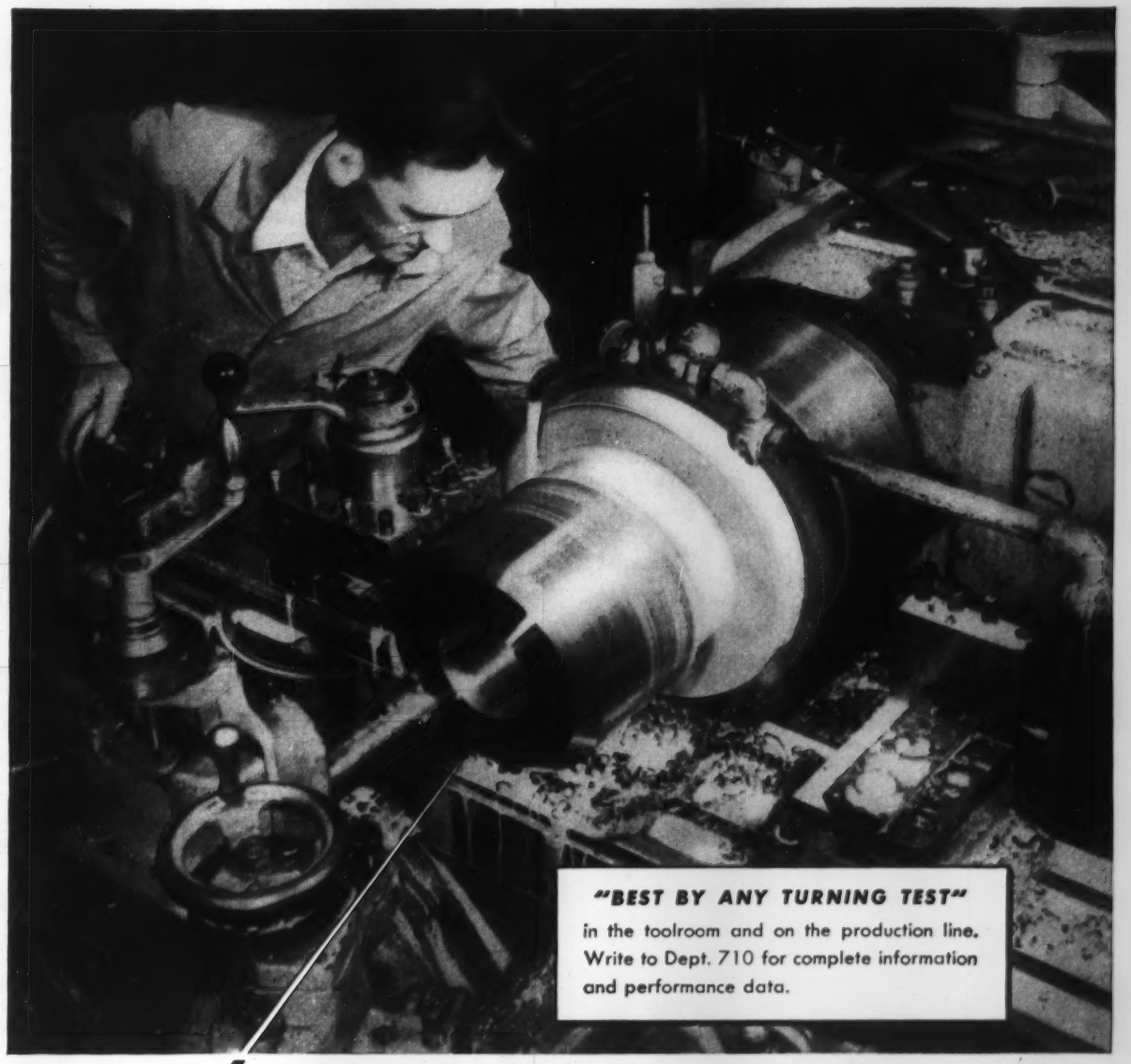
Further, the sources of supply for the raw material are plentiful, and will continue to increase.

MCA Ferrocolumbium is available in a variety of screen sizes to meet manufacturing requirements. It will pay you to investigate this new supply source, today.

MOLYBDENUM

Grant Building CORPORATION OF AMERICA **Pittsburgh 19, Pa.**

Offices: Pittsburgh, Chicago, Los Angeles, New York, San Francisco
Sales Representatives: Brumley-Donaldson Co., Los Angeles, San Francisco
Subsidiary: Cleveland Tungsten, Inc., Cleveland
Plants: Washington, Pa., York, Pa.


"BEST BY ANY TURNING TEST"
in the toolroom and on the production line.
Write to Dept. 710 for complete information
and performance data.

Jones & Lamson turret lathes are BUILT and POWERED TO PRODUCE

MORE CHIPS per tool
MORE PIECES per hour
MORE PROFIT per job . . . than any turret lathe of comparable size!

JONES & LAMSON

the man who needs a new machine tool is already paying for it

JONES & LAMSON MACHINE COMPANY, 517 Clinton St., Springfield, Vt., U.S.A. J&L MACHINE TOOL DIV.

Quality Sheet From Pittsburgh Steel Cuts Cost Of Kitchens

Sheets are sheared for cabinet base floor and cutting board guides.

Helps Build
Long Life, Beauty
And Durability into . . .

Youngstown Kitchens

(Advertisement)

Youngstown Kitchens Division of American Standard is the world's largest producer in its field.

Gleaming Youngstown Kitchens have developed an excellent reputation for quality over the past 25 years. Much of this is due to the steel sheets going into sink, wall and base cabinets turned out at Youngstown Kitchens' big Salem, Ohio, plant.

Like many other major sheet users in the automotive and appliance fields, Youngstown Kitchens has come to depend on quality sheet from modern rolling facilities of Pittsburgh Steel Company. Youngstown demands steel sheet that will meet all requirements for precision in its kitchens. At the same time, the steel must enable Youngstown Kitchens to keep its production costs in line to meet the vigorous competition of the kitchen unit field.

Here are the qualities Pittsburgh Steel's sheet delivers uniformly to help make better Youngstown Kitchens at lower cost:

• **Top Notch Internal Quality** is reflected in the sheet's accurate chemical analysis and proper grain structure. Freedom from defects reduces scrap and cuts down the number of inspections necessary. Sinks and cabinets move quicker on the assembly line.

• **Superior Surface** is a characteristic of all Pittsburgh Steel's sheets. A clean, bright and reflective surface on the sheet assures a proper base for enameling. A surface short of the best lets blemishes show through after enamel has been applied.

• **Flatness And Dimensional Uniformity** in the sheet are important to the manufacturer. Pittsburgh sheet makes good on both counts. Absence of waves in sheet makes a trimmer-looking product to catch the eye of the ultimate customer. Youngstown Kitchens can rely on Pittsburgh Steel to provide cold rolled sheet that will not vary in thickness from sheet to sheet or from shipment to shipment.

• **Shapeliness In The Sheet** means it performs well on forming machines, retains its inherent strength while assuming graceful, functional shapes which add beauty to Youngstown Kitchens.

Uniform sheet characteristics like these have built a big demand for Pittsburgh sheet steel. Not every producer can match Pittsburgh sheet's uniformity, so if you require uniform high quality, investigate its advantages today. A phone call to the nearest district office will bring quick results. And your order will get prompt, personal attention from the time it is entered on the books until you receive the shipment.

In final assembly drawers and hardware are added.

Surface cleanliness shows up in bond of sprayed enamel.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices				
Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
Cleveland	Dayton	Los Angeles	Pittsburgh	

(Advertisement)

8 Years of maintenance-free super corrosion resistance!

and *Carpenter* Stainless No. 20Cb is still on the job!

• Pickling tanks made of wood, acid-proof cement and other stainless steels met with little success in coping with the severe corrosion of hot sulphuric acid solution. Then Carpenter Stainless No. 20Cb was given a try.

Now, after eight years of almost constant two-shift use, this special sulphuric acid-resisting alloy still shows no need for maintenance. The tank contains 4 to 8% sulphuric acid solution at temperatures up to 165°F and is used for galvanizing sheet metal products.

If you build or use equipment handling concentrations or solutions of sulphuric acid or other highly corrosive acids, liquids or gases, see why Carpenter Stainless No. 20 and No. 20Cb can help you cut corrosion costs. These super corrosion-resistant alloys are available in tubing, pipe, sheet, plate, bars, strip, wire and billets.

Call your nearest Carpenter Distributor or Branch Office for full information and help.

MEMBER

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Ask for a copy of the Carpenter Stainless No. 20 and No. 20Cb handbook.

Carpenter

Stainless Tubing & Pipe

Synchronous Speed with Induction Simplicity

NEW *Synduction* Motor

MORE

Motor Pioneering by Allis-Chalmers makes constant speed sure and inexpensive

Constant speed from no load to pull-out regardless of load and voltage fluctuations . . . simple across-the-line control . . . fixed speed ratios for a group of synchronized drives . . . high power factor . . . high efficiency — every one of these characteristics is included in the greatest motor design advance in years, the *SYNDUCTION* MOTOR.

Here is a motor that combines the simple dependability of squirrel-cage construction with the constant speed advantage — and none of the complications — of other types of synchronous designs.

Available in all squirrel-cage enclosures and in ratings from ¼ to 40 hp, the *Synduction* motor means new operating economies at lower initial cost in many industries.

Synduction is an Allis-Chalmers trademark.

Have You An Application Requiring:

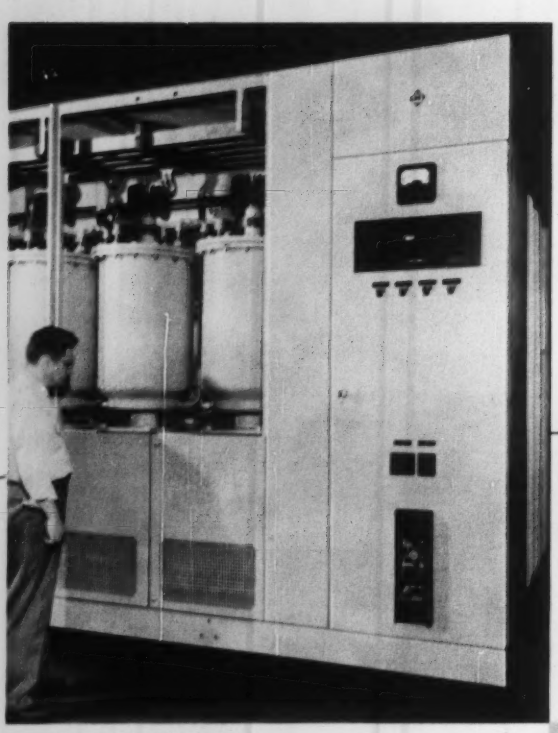
1. unvarying speed; 2. operation of several motors at fixed speed ratios; 3. adjustable speed with minimum variation at any speed setting? If so, Allis-Chalmers invites your inquiry. Contact your nearby A-C office or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis., for Bulletin 51B8440.

A-5110

ALLIS-CHALMERS

Two Separate Circuits Mean

Reliable Rectifier Operation



Mercury Arc Rectifiers

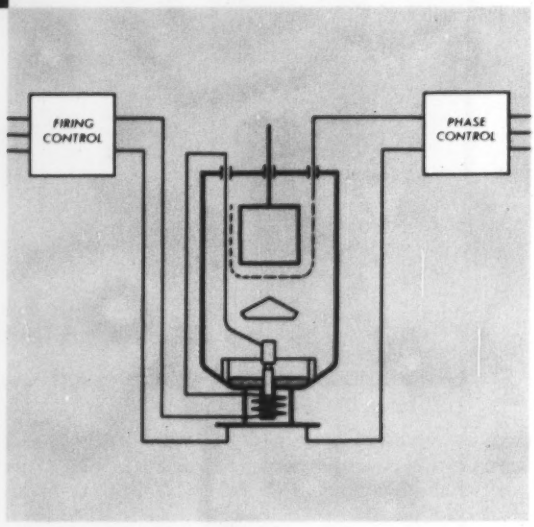
One of four metal-enclosed assemblies in a midwestern installation with a total capacity of 15,000 kw at 620 volts, dc.

1. Firing Circuit

A small dc excitation arc is automatically ignited only once, when the unit is started. It is then maintained on the mercury cathode of each rectifier tube. It offers advantages similar to a pilot light. Since it is far easier to maintain an arc than to start it, this feature reduces the chance of the excitron losing excitation during power supply disturbances.

2. Phase Control Circuit

A separate circuit utilizes the deionizing grid to obtain phase control. Grid-type phase control permits operation in the clean region near the anode where ion density is lowest, instead of on the surface of the cathode mercury pool where there is turbulence and contamination. Reliability of phase control does not depend on the condition of the mercury. This is an exclusive excitron feature.



Only Excitron Rectifiers Provide Separate Circuits

for these two all-important functions. Improved operation results — one function is never sacrificed for the other — you get optimum operation from each.

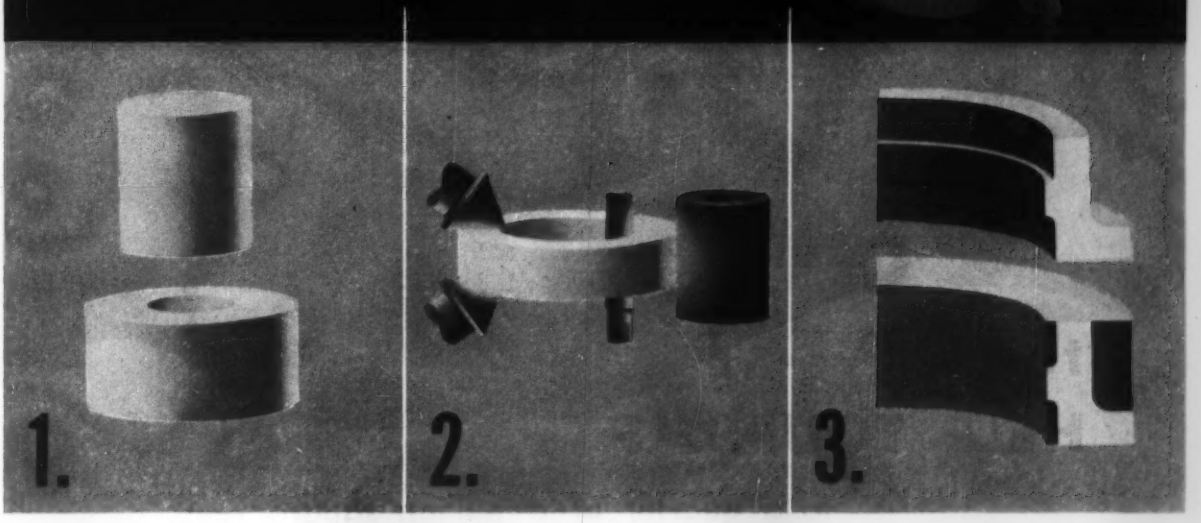
For Complete Information on rectifier operation, call your nearby A-C office, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5136

Why users get better service from Edgewater

ROLLED STEEL RINGS



1. A solid block of steel sliced from an ingot or rolled bar and heated to forging temperature is upset and punched, forming the "blank."

2. The Ring Rolling Mill enlarges the diameter of the blank, reduces its thickness and forms the ribs, flanges, etc., as required, in one continuous operation.

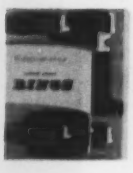
3. Upper view shows accurately shaped section of typical ring, as rolled. Lower view shows material wasted if machined from plain rectangular ring.

FORGING and ROLLING give Edgewater Rings

Maximum strength and toughness with minimum weight

Edgewater Steel Company

P. O. Box 478, Pittsburgh 30, Penna.



WRITE for a 12-page bulletin detailing the Edgewater process for making weldless steel rings.

ARE RINGS YOUR PROBLEM?

then HELP YOURSELF

WELDING

FABRICATING

MACHINING

Send us your blueprints and we will show you how we can fit into your picture.

to a quarter of a million square feet equipped to solve your problem

American Welding has a quarter of a million square feet of floor space that houses the equipment necessary to manufacture production runs of welded rings (made from rectangular bars or special mill shapes) or circular weldments — from 6″ to 96″ in diameter, of ferrous or non-ferrous metal.

And that's not all — 900 specialists in ring manufacture are backed with the best in engineering and research — with heat treating, x-ray and test equipment required to meet aircraft specifications.

Let Amweld become your production welded ring department.

THE AMERICAN WELDING & MANUFACTURING CO.
110 DIETZ ROAD • WARREN, OHIO

AMERICAN WELDING

STEEL

September 24, 1956

Metalworking Outlook

Construction: Gains To Continue

Look for construction volume to reach $53 billion by 1965, predicts Melvin H. Baker, chairman of National Gypsum Co. That would be $9 billion above the $44 billion expected for 1956 and $5 billion above the $48 billion STEEL forecasts for 1957. Mr. Baker foresees $5.5-billion outlays next year for roads and privately owned utilities, 10 per cent gains in industrial and commercial construction ($3.3 billion expenditures for plants) and record construction of new schools. He foresees slight gains in homebuilding next year. New starts in 1956 will fall to about 1,070,000 units, 250,000 under 1955.

Westinghouse Doubles Research

Westinghouse Electric Corp. is spending $150 million a year for research, development and engineering. That's about 10 per cent of company billings, double the rate of expenditure five years ago and seven times the total spent for advertising and sales promotion. Those facts came out at the dedication of the company's new research laboratories Sept. 20 at Churchill Borough, Pa., near Pittsburgh.

Space Suits and Molybdenum

Men will work in "space suits" if a proposed pilot plant being designed by Universal-Cyclops Steel Corp. becomes a reality. The facility would be completely conditioned in an argon atmosphere to facilitate working with molybdenum. The metal could be forged, for example, in the 3500 to 4000°F range. The purpose is to prevent oxygen contamination of molybdenum to get an improved metal suitable for more uses. Personnel would have to be in air lock suits of sponge rubber to exclude as much air as possible.

The Market for Computers

A $2-billion market for large electronic data-processing systems is forecast by Datamatic Corp., Newton Highlands, Mass. Datamatic claims a giant "brain" becomes a good buy when annual gross sales are 100 times the annual cost of the system. It says a $2-million system can be afforded by a $36-million-a-year company. Some 15 major producers now make large data-processing systems.

Memo on Radio, TV Prices

Radio receiver prices have been markedly stable for some months, the average sticking at $21. Watch for the stability to continue for the rest of the year. On the surface, the average price of television sets appears to be declining—at $120 now, compared with $130 at midyear in 1955 and $145 at mid-1954. That average price decline, particularly in the last year, has been caused largely by changes in the product mix. Less expensive portable models have been selling well, to pull the average down. Now the mix is stabilizing, so look for a rise in the average quotation be-

Technical Outlook—p. 115 Market Outlook—p. 147

cause TV prices generally are going to go up, notably in the last two months. Average prices now are level at about $120.

Freight Rates To Rise?

Freight rate increases of 15 per cent will be asked by railroads of the East and West. Southern roads will await the outcome of pending wage negotiations before seeking the boost. The hikes would come on top of 6 per cent general advances authorized last March. Don't expect an Interstate Commerce Commission decision on the petition before the first of 1957.

Shift in Canada

The rate of U.S. investments in Canada is easing (whereas the rate of U.S. investments in Latin America is increasing). Some Canadians who were complaining about the degree of American ownership are now worried that American investors will cut down their movement of funds across the borders. Another question in Canada: Will U.S. firms start more profit-taking from their dominion investments.

Metal Stockpiling Harmful?

Politically motivated metal stockpiling has been forcing thousands of small businesses to the brink of bankruptcy, charges Col. Willard F. Rockwell, chairman of Rockwell Mfg. Co. He claims: "Government stockpiling of aluminum created such a shortage of aluminum scrap that secondary aluminum could only be purchased at 8 cents above the primary aluminum price three months ago. But when the aluminum stockpile was completed, the secondary price dropped. Small businessmen had to absorb terrific inventory losses." Another statement: "After cornering all normal-priced nickel, our government contracted for premium nickel at prices 40 per cent above normal." Colonel Rockwell says that encourages "defense profiteering."

Help, Fire!

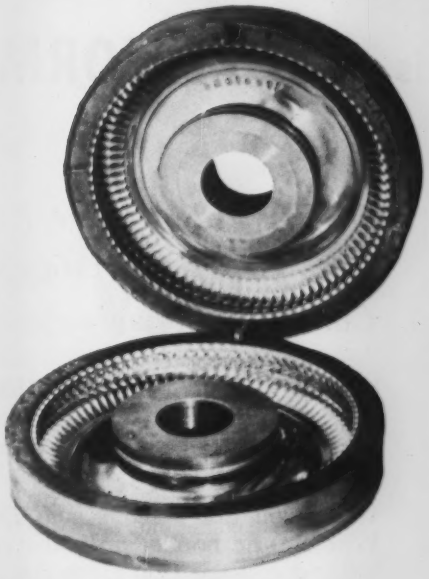
America's fire losses in the first half hit $517.4 million, up 10 per cent from the same 1955 period. If trends are continuing, industry's share of that was up even more than 10 per cent. In 1955, total losses rose 2.5 per cent over 1954 levels, but manufacturing's damage was 11.8 per cent higher.

Straws in the Wind

Price increases: Deere & Co. will add 5 per cent to most of its farm items; General Electric Co. boosted its capacitor lines about 7.5 per cent; Pullman-Standard Car Mfg. Co. has raised freight car quotations 2 to 6 per cent . . . New order backlog for Cincinnati Milling Machine Co. has risen to $113 million from $107 million on June 30 . . . Jones & Laughlin Steel Corp. is searching for additional iron ore reserves in Ashland county, Wisconsin . . . Some 180,000 apprentices are now working in registered programs . . . Lone Star Steel Co., will raise steel prices an average of $10 a ton.

STEEL MACHINING CASE STUDY

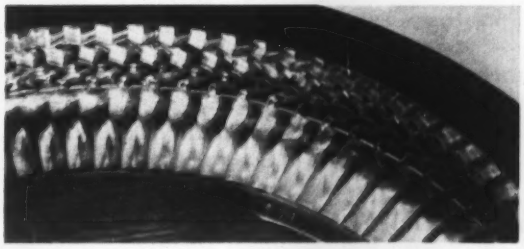
How $30 worth of steel plate took the risk out of a $4000 machining job!



There's a quick, sure way to select exactly the right steel—whatever your particular application. Draw on the wide experience of Ryerson specialists who are working with hundreds of other steel users on similar problems every day. The right steel can make a big difference—can mean a better product, lower production costs—as the following case study illustrates.

THE PROBLEM—Central Mold & Machine Company of Akron contracted to make a chrome-plated mold for producing an exact duplicate, in miniature, of Firestone's new Supreme tubeless tire.

Only a very small piece of plate steel was needed for the job—but the steel had to be extraordinarily clean and sound. Hundreds of hours of machining time were to be "invested" in it and some of the tiny lands that formed the unusually intricate tread design were only .015 of an inch thick!



A close up of the mold for the 6" tire showing intricate machining with lands only .015" thick.

SOLUTION—Working with a Ryerson representative, Central Mold & Machine selected New E-Z-Cut plate for the job. Because this Ryerson leaded plate steel is remarkably clean and free of excessive stringers, even the finest lands of the mold were sharp and true. Because New E-Z-Cut machines as much as 30% faster than mild steel plate, the difficult machining job was completed in minimum time. And because New E-Z-Cut machines to a high finish and polishes readily, the mold was very satisfactorily prepared for plating, at low cost.

If a better quality free-machining plate had been available at any price it would have been used here because, at almost any price, the cost of the steel would be only a tiny fraction of the cost of the finished mold. New E-Z-Cut (approximately $30.00 worth) was used because it took the steel risk out of a $4000 machining job.

Whatever your steel problem, it will pay you to check with Ryerson specialists and draw on Ryerson stocks of highest quality, special purpose steels.

NEW E-Z-CUT PLATE VS. MILD STEEL
A Machining Demonstration
Booth 405—National Metal Exposition

The remarkable machinability of our New E-Z-Cut leaded plate steel will be demonstrated at the October National Metal Exposition in Cleveland. Don't miss it!

Flame cutting also demonstrated—Watch the actual burning of intricate steel shapes with electric eye equipment.

RYERSON STEEL

In stock: Carbon, alloy and stainless steel . . . bars, structurals, plates, sheets, tubing, reinforcing bars, machinery & tools, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

The PROOF of the STEEL is in its PERFORMANCE

Courtesy Lamar Pipe & Tile Div., American Marietta Corp.

DSC Welded Wire Fabric Puts Crack-Resistance Into Concrete Construction

Here's a section of 120" LO-HED reinforced concrete pipe. You can see how big it is from the trucks and pipe storage yard in the background.

What you don't see is the DSC Welded Wire Fabric bonded into the concrete. Its latticed construction gives the pipe flexible steel muscles, makes it strong and durable, gives it crack-resistance.

For the very same purpose DSC Fabric goes into many other kinds of concrete construction. Here is a partial list:

In pavements—for streets and turnpikes

At airports—in aprons and runways

In the home—in floors, walls, foundation slabs, patios, swimming pools

On the farm—in silos, barns, feeding floors and yards

All types of industrial structures . . . Precast products of all kinds . . . Driveways and sidewalks . . . Bridges.

DSC Welded Metal Fabric is "woven" at our Portsmouth Division, Portsmouth, Ohio. The "threads" consist of Portsmouth Bright Basic Low Carbon Reinforcing Wire. The "warp and woof" intersections are spot-welded electronically.

Here, job-performance is the ability of the Fabric to resist estimated stresses and strains. It depends on sound welds and conformity to size, gauge and physical requirements.

Whether it's Rod and Wire products or Sheet or Strip—DSC *steelmanship* is the same. A DSC Customer Representative is eager to work with you.

Call him . . . today?

Customer Satisfaction Is Our Business

DETROIT STEEL CORPORATION

GENERAL SALES OFFICE, DETROIT 9, MICHIGAN

CUSTOMER "REP" OFFICES:

Charlotte, N. C., Chicago, Cincinnati, Cleveland, Columbus, Ohio, Dayton, Ohio, Detroit, Grand Rapids, Mich., Hamden (New Haven), Conn., Indianapolis, Jackson, Mich., Louisville, Ky., New York, St. Louis, Toledo, Worcester, Mass.

DSC MILL PRODUCTS

Hot Rolled and Cold Rolled Sheets
Cold Rolled Carbon Steel Strip • Flat Cold Rolled Carbon Spring Steel
Low and Med. Carbon Manufacturers' Wire • High Carbon Specialty Wire
Aluminum Cable Strand Reinforcement • Rope Wire • Tire Bead Wire
Welded Wire Fabric

MILLS | PORTSMOUTH, OHIO (Sheets, Rods, Wire)
DETROIT, MICH. and HAMDEN, CONN. (C.R. Strip)

COPYRIGHT 1956

STAMPINGS

PMI MEMBERS ARE STAMPING EXPERTS
—any size, shape or metal—any quantity (long or short run).
For quick information on dependable sources call
Pressed Metal Institute, 3673 Lee Road (SKyline 1-8855) Cleveland 20, O.

PMI

Adv. Courtesy DSC

Get Out the Vote!

The most appalling aspect of our democratic way of life is the utter apathy of the average citizen, whether worker or businessman, toward his right to vote and contribute to good government.

The election that swept President Eisenhower into office in 1952 brought out an unusually high yet disappointing total of 62 per cent of the 100 million U.S. citizens of voting age.

In the interim elections two years later, people who had voted in 1952 stayed away from the polls in droves. In the seven most populous states having elections, 5.5 million fewer people voted.

This shocking lack of interest in government is no recent political phenomenon. In the presidential elections of 1948 and 1944, only slightly more than half the people of voting age appeared at the polls.

Half a century ago three out of four of our fathers and grandfathers deemed it a privilege to exercise their right to vote!

Apathy at the polls in recent years undoubtedly may be attributed to the postwar expansion and prosperity that have lulled the average U.S. citizen into a state of complacency.

What can be done to get out the vote? The AFL-CIO, for instance, is distributing to its 15 million members a voting guide listing senators and representatives who vote "right" and "wrong" on legislation affecting the unions.

What can you do as an individual?

Between now and the elections on Nov. 6 you can find out about the candidates and the issues.

You can see what you can do to help the party of your choice, especially at the precinct, grass-root level.

You can urge your fellow workers, including the younger ones, to become informed politically and help.

America now has 106 million people with the inalienable right to share in good government. The outcome of the election is in their hands. No kind of magic will win for any candidate or issue at the polls.

You can do your part by becoming as well acquainted with the candidates and the issues as you are with the pennant race in the National League or the daily stock quotations. In the process, you'll ally yourself with the Republicans or Democrats or be an Independent. You'll stand for something. You'll help get out the vote. You'll vote.

Irwin H. Such

EDITOR-IN-CHIEF

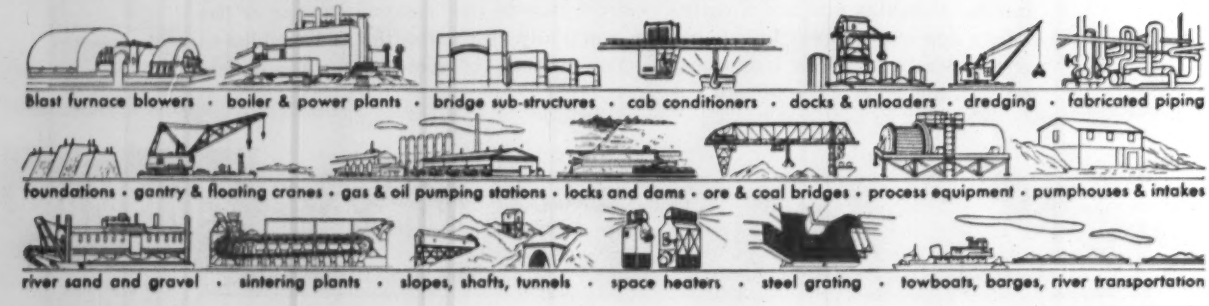
Twenty-five tons in one bite!

This rugged Dravo-built ore unloader works around the clock at Pennsylvania Railroad's Greenwich Point pier in Philadelphia. A specially-designed man trolley operates the 25-ton bucket with the accuracy and speed necessary for efficient unloading.

For Pennsylvania Tidewater Dock Company, operators of the pier, this structure has meant smooth handling and increased capacity. A second ore unloader was ordered six months after the first one was installed.

Many users save time and trouble with Dravo heavy materials handling equipment. You'll find these barges and unloaders working at many of the nation's steel plants, power plants and other heavy materials transfer points. For specific help on such machinery or the other Dravo products and services listed below, write DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

DRAVO
CORPORATION



Blast furnace blowers • boiler & power plants • bridge sub-structures • cab conditioners • docks & unloaders • dredging • fabricated piping

foundations • gantry & floating cranes • gas & oil pumping stations • locks and dams • ore & coal bridges • process equipment • pumphouses & intakes

river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

Thompson Products Inc.

Packaging Boom Assured

Here's one industry that seems to move in direct relation to the GNP. Self-service retailing and more attractive industrial packages are two of the trends

WRAPPING UP the nation's products is a $10-billion business, using the yardstick that packaging is 2.5 per cent of Gross National Product. Counting machinery, labor, overhead and outside services, *Modern Packaging* magazine suggests the packaging bill is closer to $20 billion.

The industry figures to expand in direct relation to the expanding GNP. With some economists predicting a GNP of $450 billion by 1960 and $750 billion by 1975, packaging costs will hit at least $22.5 billion and $37.25 billion in those years. New developments in the field could push the figures even higher. Refinements in packaging machinery and progress in packaging engineering are foregone conclusions, as competition intensifies.

What It Takes — Metalworking has a big stake in the business (see table). Other requirements: 4 billion board feet of lumber a year; 17 million tons of paper; 70 per cent of the glass produced in the country (other than flat glass); 80 per cent of the burlap; 99 per cent of the cellophane; and 22 per cent of all plastics.

Printing inks, dyes, chemicals and adhesives are used in quantity. Not counting cellophane and foil, every man, woman and child in the U. S. annually consumes 1500 packages.

Significantly, the National Packaging show has grown 12 times in number of exhibitors, 50 times in exhibit area and 15 times in attendance since it was first held 25 years ago. The American Management Association sponsors it.

Trends—On the retail level, extension of self-service is boosting the emphasis on modern packaging. Besides food and drug self-service centers, you can also find hardware stores and soft goods merchandisers offering the new convenience. Shopping by punched card techniques has made its appearance in the last two years.

Possibly 25 to 40 per cent of the packaging industry's volume is in industrial products. Here there's much practical concern with corrosion prevention, protection of fragile electronic parts and the more efficient handling of parts and material.

More attention is being directed to the eye appeal of the industrial package. An attractive package sells the product, say the experts, on the wholesale as well as the retail level.

Machinery—The growing demand for faster and more automatic packaging machinery saw 1955's new machinery orders exceed 1954's by 33 per cent. Included are canning and bottle filling machinery, counting machines, electronic inspection apparatus, labelers, cappers, cartoners and sealing equipment.

Among materials, paper still tops the list: The folding paper box is probably the most widely used form of packaging. Plastic is making giant strides, but metal and

glass are being used in ever greater quantities. Material combinations are more common: Better ways have been found to bond films, paper and foil with laminates.

In general, the packaging of consumer products is more automatic than industrial product packaging, although intensified competition in the industry is rapidly leading to new developments in industrial packaging.

To the Point—Packaging problems vary widely from company to company. Thompson Products Inc., Cleveland, offers some suggestions (based on experience in its valve division) for more effective packaging: 1. Have an established organization for packaging. 2. Delegate responsibility in an orderly manner. 3. Establish packaging specifications. 4. Evaluate current and past methods of packaging. 5. Study and improve your methods of handling for packaging. 6. Utilize existing work areas. 7. Co-operate with elements of the packaging industry.

In metalworking, the heaviest packaging bills are run up in the electrical equipment, automotive, appliance, business machine and precision tool industries.

Steel's principal contribution to the packaging industry is through canmakers. In the first half of 1956, they manufactured a record 18.7 billion containers. Drummakers are turning out 36 million drums of all sizes annually, mainly for the petroleum and chemical industries. Steel strapping is making great gains in the packaging field because it simplifies the fastening of larger packages and adds the strength necessary for stacking and storing.

First Show — This month, the Packaging Machinery Manufacturers Institute held its first Packaging Machinery & Materials Exposition in Cleveland. R. L. Sears, executive director of the institute, reports the show was well attended, with exhibitors "writing a lot of business."

Almost 200 new machines were exhibited. Says the show management: "About 12 per cent of the exhibitors considered simplification of operation and increased versatility in packaging machines most desirable, while 50 per cent felt higher production speeds to be of the greatest significance." Speed is the best cost cutter.

Self-service merchandising at the consumer level is the biggest factor behind the need for more speed in packaging, experts say.

The Market—Packaging machinery prices went up at the beginning of 1956, and industry sources feel prices of standard machines will remain steady well into 1957. New types appearing on the market may run about 5 per cent higher than comparable machines did a year ago.

Examples — Package Machinery Co., East Long Meadow, Mass., exhibited a frozen food machine which wraps 400 packages a minute, compared with the present rate of 250.

A machine developed by Arthur Colton Co., Detroit, fills glasses or bottles at a rate of 480 per minute. Peters Machinery Co., Chicago, is marketing a unit which forms and glues 9000 cartons an hour. The machine produces the cartons from a die cut cardboard blank.

Attendance at the show was estimated at 15,000.

Metalworking Wraps It Up

	Tons used annually by packaging industry	Per cent of total U. S. production
Finished steel	7,000,000	8
Aluminum	100,000	7
		Per cent of total U. S. consumption
Tin	45,000	50

Note: About 80 per cent of the metal foil produced in the U. S. goes to the packaging industry. Most foil is made from aluminum or tin.

New Ore Discovery?

Rumors were flying around the usually staid iron ore industry last week.

Reports were that "the largest alluvial deposit of high grade iron ore in the world" had been found in the Black Hills of Arizona, 45 miles northeast of Tucson. Ore was reported to assay at 60 to 68 per cent iron content. Initial production is projected at 150,000 tons a month, starting in early 1957. The find is claimed by Omega Mines Inc., Las Vegas, Nev.

Cleveland and eastern area ore experts were adopting a "wait and see" attitude. But if the find proves out, they said, it would be of vital interest to west coast steel mills.

Mesta Gets Bethlehem Order

Mesta Machine Co., Pittsburgh, will design and build two 48-in. skin pass mills for the Sparrows Point (Md.) plant of Bethlehem Steel Co.

The 2-stand, tandem, 4-high mills will be geared for a maximum speed of 4500 fpm. They will skin pass cold reduced, annealed steel strip in tin plate gages.

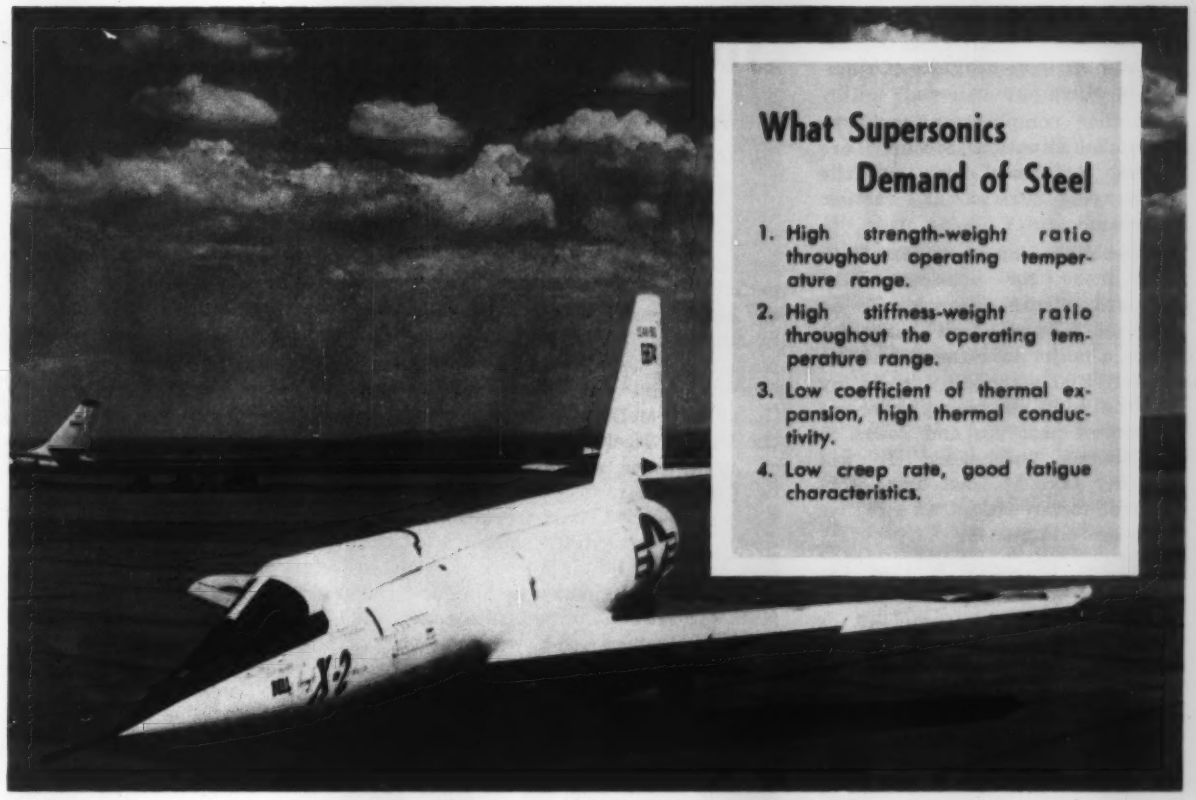
Steel strip with a maximum width of 44 in. and coils 56 in. in diameter (weighing 600 lb per inch of width) can be processed by the 4333-hp mills.

Merger in Steel

Acme Steel Co., Chicago, has consummated its deal with Newport Steel Corp., Newport, Ky.

Newport is now a wholly owned subsidiary of Acme, and will be operated as a new Illinois corporation under the name of Acme-Newport Steel Co. Present Newport management will continue: A. P. Miller will be vice president and general manager; Carl M. Riefkin, vice president-sales.

Acme spokesmen say that the move will give them more control over raw material supplies (Newport has steelmaking facilities, Acme does not). Product lines will not be materially changed. Combined annual sales for the companies should approximate $170 million a year at present operating rates.



What Supersonics Demand of Steel

1. High strength-weight ratio throughout operating temperature range.
2. High stiffness-weight ratio throughout the operating temperature range.
3. Low coefficient of thermal expansion, high thermal conductivity.
4. Low creep rate, good fatigue characteristics.

Supersonic Bell X-2 points the way as . . .

Stainless Gets Its Wings

STAINLESS steel producers are shooting high when it comes to figuring market demand for supersonic aircraft.

Says U. S. Steel Corp.: "Two years ago, we anticipated that the airplane of tomorrow would soon reach a point where nothing less than a metal with the basic properties of steel would meet airframe requirements. Since that time, steel has emerged without a doubt as the best engineering material for future airframe construction."

Consensus — Other producers agree. Allegheny Ludlum Steel Corp. puts it this way: "Prospects for stainless steel use in airframes and jet engines are bright."

Crucible Steel Co. of America adds: "Recent studies have shown that stainless steels and titanium alloys rank high as materials that appear feasible for high supersonic speeds because of the temperatures resulting from aerodynamic heating."

Republic Steel Corp. has predicted that 50 per cent or more of tomorrow's supersonic planes will be stainless. If that prediction holds up, it indicates a possible market for about 50,000 tons of stainless a year (two weeks' production of all products at 100 per cent of capacity). The figure is based on current rates of military procurement. Eventually, the market could be even bigger when you consider that aircraft are getting bigger and heavier all the time.

New Look—Today's heavy bomber, for example, has an airframe weight of 115,000 lb. Its World War II counterpart weighed less than half that, about 49,000 lb.

A modern jet fighter has an 8000 to 12,000-lb airframe, compared with 5000 lb for the same type plane ten years ago. In practically every other type of airplane —from trainers through heavy transports—the story is the same: Airframe weight has more than doubled.

Snags—But the picture isn't quite so rosy as it may look—there's a matter of producing the kind of stainless the aircraft people want. They want it uniformly long, thin, flat and to close tolerance.

Producers admit that they are going to have troubles turning out that kind of metal in the quantity that may be required—but they're working on it.

However, no one is sure of just how big a market is opening up, just how much of an investment in new—and probably special—equipment is justified.

Restrictions—Expansions are being planned, but one spokesman says: "If the more optimistic estimates materialize, there won't be

enough capacity before 1960, when you consider the growing population and the increasing use of stainless in other applications."

Another complication could be the nickel situation. Steelmen are looking for steels using as little nickel and other critical materials as possible.

Close Work—Some requests have been made for one-fourth the standard tolerance limits. To do that on a continuous basis requires a major investment and it's unlikely that a company would lay out the kind of money involved in view of past ups and downs in government purchasing. It will probably take at least some government money to get an effective program rolling soon.

Another difficulty is that the grades of stainless wanted can't be pinpointed. One complaint is that there isn't enough agreement on just what combination of strength, corrosion resistance and other properties the aircraft people want—or will settle for. Present steel plans seem to be to make do with modifications of present types and at the same time to work toward new types closer to the ideal.

There is general agreement that exacting specifications are necessary. Anything less would exact weight penalties, resulting in loss of speed or range. That's why the materials engineer is becoming more important on aircraft design teams.

Superalloys—While problems of using stainless in airframes are perhaps only beginning, steelmen feel they've done a good job on supplying materials for engines. But they think stainless may lose a little ground, especially in the "hot" part of the turbine. So the superalloys are getting a working over for the same problems faced in airframe materials. Vacuum melting is the best answer so far.

Steelmen put a lot of faith in a growing market in stainless extrusions. They say: "We've only scratched the surface, but we've got programs going." Being studied are the extrusion process itself and the possibility of combining extrusion with a series of cold draws to give a surface that the aircraft people can use without machining.

Steelworkers Map Plans

New drive on clerical, technical workers tops union's goals during next three years. Los Angeles convention marked by absence of fireworks

"ALL OF US—labor, management and owners—are in this thing together. We may not always agree on the best way to reach our goals, but the plain fact is that our goals are more or less the same and our interests have much in common."

David J. McDonald, president of the United Steelworkers of America, used those words to reassert his "mutual trusteeship" philosophy at last week's eighth constitutional convention of the union in Los Angeles.

Future—The union's goals, asserts Mr. McDonald, include a continued "sharing the wealth of American industry," improved welfare benefits, more thorough organization of clerical and technical workers.

A continuing study of the problems of automation will be made, he said. He also served notice that a shorter work week was high on the list of demands, and that the union must find means to take care of members already retired from active service.

Present—Last week, it looked like the meeting would be one of the quietest, least spectacular shows in union history. Mr. McDonald has an effective answer to anyone opposing his leadership on the ground that he's "too soft toward management."

As evidence, he held up the five-week strike which brought workers a three-year contract which the union estimates to be worth more than 45 cents an hour. There's no conflict between the strike and his theories of mutual trusteeship, he says. "In 1956, it was necessary for the labor trustees in the great American steel industry to call to task the management trustees and force them by means of a strike to live up to their mutual trusteeship.

"There are signs of enlightened labor relations policies from modern management, but we must frankly say that in most cases, only because of the painful education given it by the unions."

Dues Hike—The union isn't restricting its demands to management for more money. A proposal was made to boost dues from $3 to $5 a month. This will give the union a monthly revenue of $6.5 million, split equally between the international and the locals. The net worth of the steelworkers is estimated at some $21.4 million.

Part of the increase would go to boost salaries. It was reported that the union's vice president and secretary-treasurer would get $35,000 a year instead of their present $25,000. Mr. McDonald would also get a $10,000 increase, putting his salary at $50,000. District directors and staff representatives would also get increases.

Steel Mills Ask Tax Aid

Requests of three steel companies for special tax consideration on expansion programs pushes the total before the Office of Defense Mobilization to more than $1 billion.

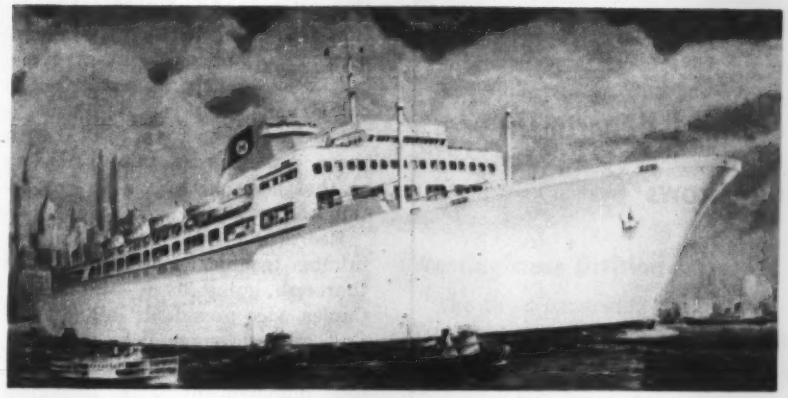
Inland Steel Co. has asked for fast amortization on a $100.2-million rolling mill expansion at its East Chicago plant.

Crucible Steel Co. of America, Pittsburgh, filed applications totaling $62,818,000 for expansion of coke and rolling mill facilities at Midland, Pa.

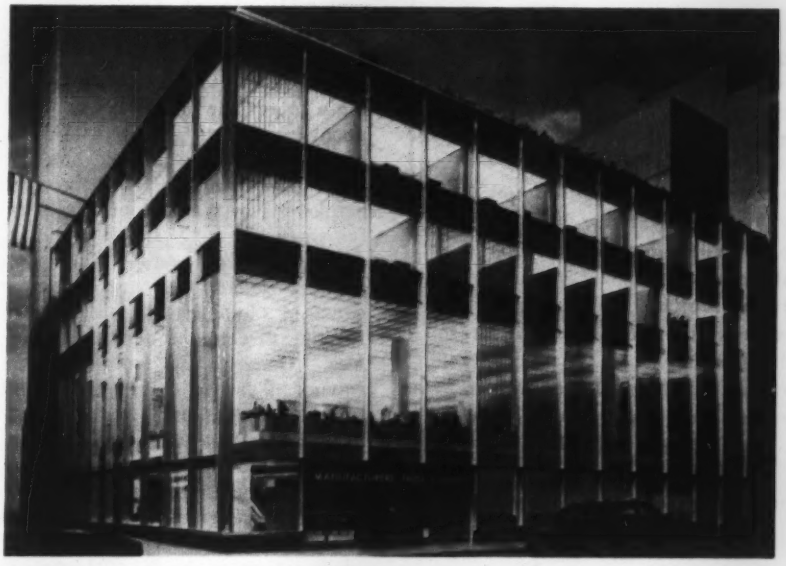
Lukens Steel Co. asked for a fast tax write-off on a $40-million expansion of its heavy steel plate facilities at Coatesville, Pa.

The proposal to again give tax write-offs to steel mills is not expected to be acted upon by ODM until mid-October. But there are many more requests on file, including:

U.S. Steel Corp., $455.2 million; Jones & Laughlin Steel Corp., $250 million; Kaiser Steel Corp., $65 million; Inland Steel Co., $40.9 million (a previous request); Youngstown Sheet & Tube Co., $24.3 million; Detroit Steel Corp., $16.4 million; Alan Wood Steel Co., $7 million.



On sea, through shipbuilding jobs like this . . .



Ashore, with structural steel work like this . . .

Ingalls Hits Its Stride

MANY PEOPLE think that U. S. shipbuilding is a depressed industry.

But there are exceptions. Ingalls Iron Works Co., Birmingham, offers one. Its shipyards are being expanded. The company's other divisions, specializing in steel fabricating work, are also doing well, giving a diversified lift to the company's over-all business picture. In 1953, Ingalls' total bookings were $62 million. This year, they're running at over $105 million.

High Water — The company's shipbuilding division has more than doubled its volume of orders in this period. The company is spending over $3 million to improve Pascagoula, Miss., facilities. Yards at Decatur, Ala., are also being regroomed.

Ingalls recently landed a contract to build two large passenger-cargo vessels for Moore-McCormack Lines Inc. They are under construction at its Pascagoula yards, and are the biggest passenger vessels ever built on the Gulf Coast. In addition, the Company has a Navy submarine contract. It has built merchant ships and tankers for the Maritime Administration, ice breakers and other vessels for the Navy, in addition to regular commercial contracts.

Diversification — Other Ingalls divisions are benefiting from a continuing expansion program. At the Birmingham fabricating plant, where order volume is up 26 per cent since 1953, new cranes, radial drills, plate shears, welding machinery and manufacturing space have been added.

At the company's Verona plant, production capacity is up almost 50 per cent. A new stainless steel air-conditioned office building has been built.

Outlook — Ingalls is betting on strength of the construction business to support continued expansions.

Steel Mills Join in Test

A new process which disposes of waste pickling acids at steel mills is being tested at a pilot plant in Niles, O., by Blaw-Knox Co. and seven steel companies.

This latest industry approach to the problem (acids are used to clean steel and remove the scale formed in rolling operations) converts waste sulphate liquors to useful sulphuric acid and iron oxide.

Lift Trucks Go West

Yale & Towne Mfg. Co. is building a lift truck manufacturing plant at San Leandro, Calif. Completion is expected early in 1957.

Elmer F. Twyman, vice president of Yale & Towne, says the plant will provide more efficient factory and spare part service to the fast growing Pacific coast industries now dependent on the company's plants in Philadelphia and Chicago.

Westinghouse Builds in Indiana

Switchgear distribution apparatus will be made at the multimillion dollar plant Westinghouse Electric Corp., Pittsburgh, is building near Bloomington, Ind.

Ground breaking ceremonies were held Sept. 15, but construction was delayed due to the shortage of steel.

Completion of the 277,000-sq-ft plant is expected by late 1957.

Personnel Department's Role Grows

It must help to guide management as well as the worker. Its growing responsibilities include:

1. **Recruiting, selection, placement and induction of new employees.**
2. **Training.**
3. **Wage Administration programs.**
4. **Methods for orderly upgrading of workers.**
5. **Criteria for evaluating and rewarding employee performance.**
6. **Policies regarding employee benefits, discipline, safety, etc.**
7. **Analysis of group teamwork vs. need for adequate outlets for individuality and creativeness.**
8. **Better communications between management and workers on company objectives.**
9. **Training management to realize that temporary roadblocks to worker co-operation are a characteristic of growing organization.**
10. **Development of the worker at all levels so that he feels his job is a necessary and meaningful part of the over-all operation.**

Personnel Men Challenged

A broader and deeper knowledge of a company's operations is necessary for tomorrow's personnel managers. Coming: Closer integration with top management

SOME 1200 company executives and personnel specialists at the American Management Association's fall personnel conference in New York (Sept. 17-19) reached this conclusion: The men charged with putting the right men in the right jobs—personnel managers—must take an active part in stimulating employee co-operation.

In their opinion, co-operation at all levels insures higher productivity. (For more on productivity, see page 105)

Necessary Role—C. Wilson Hudson, personnel manager, Radio Tube Division, Sylvania Electric Products Inc., explained: "The role of the personnel department in our organization is to assist management in developing the skill and maintaining the capacity for sustained co-operation—not co-operation as an end in itself, but as a necessary prerequisite for improved productivity."

While the framework can be developed for a team-type organization through the personnel function (see check list, left), management must remember that roadblocks are a natural result, not a catastrophe. But reported personnel men: It is up to us to deal with these problems as they come up so that serious threats to production are avoided.

Recruiting — Obtaining and retaining technical personnel got a thorough going over. William C. Caples, vice president, Inland Steel Co., offered suggestions for successful recruiting: 1. Send only top management and personnel men who are trained interviewers to the college campus. 2. Conduct systematic talent hunts in your own organization. 3. Find better ways to bring the qualified man and the job together. Establishing a talent file on employees often uncovers hidden talents. 4. Provide scholarship programs and summer work opportunities. 5. Encourage employees to recommend prospective workers.

Keeping Engineers — The engineering department must have a constant challenge or goal. Gavin A. Pitt, director of personnel services, General Dynamics Corp., warned: The company that can't provide a challenge for its engineering staff is bound to lose engineers.

Four suggestions on handling engineers were given: 1. Allow each engineer to grow. Don't keep him on one type of work. 2. Let technicians do the routine work where possible. 3. Set up a sound compensation plan so that the engineer who wants to continue in research and development is not penalized salarywise because he does not want to become a supervisor or shoulder administrative duties to reach a higher pay level. 4. Allow interested employees to seek further schooling. Some want to work toward another degree. Others may want to take a special course in a particular field of interest. Reports Mr. Pitt: "There is an opportunity for much basic research on motivating an engineer, who, though trained as a professional man, must be assimilated into group activity."

Crux: Personnel specialists feel they should become more thoroughly versed on operations, be in on top level planning sessions.

Beryllium Grows

A $4-million expansion is planned to meet the AEC's demand for pure metal

THE PRODUCTION of 500,000 lb of nuclear grade beryllium is required by a contract (estimated value $23 million) the Atomic Energy Commission awarded to the Beryllium Corp., Reading, Pa. Deliveries will be made over a five-year period.

Expansion — Walter R. Lowry, Beryllium's president, says plans call for the construction of a new plant and facilities costing about $4 million. The site has not been determined.

A contract from another source calls for $13-million worth of beryllium copper master alloy. Further gains in sales are expected as additional capacity is provided.

Beryllium's gross sales in 1954 were $7.3 million. Last year, they were $11.3 million.

Recently increased capacity at the company's Reading plant is expected to result in increased employment. Currently, beryllium copper mill products, including strip, rod and wire, account for the major portion of the company's sales.

Uses—Beryllium is used in nuclear applications because of its stability under irradiation. It reflects neutrons back into an atomic pile. The metal is extremely light, has high corrosion resistance and a high modulus of elasticity.

Before the contract with the Beryllium Corp., the only sources of nuclear grade beryllium were those owned by the government.

Continuous Casting Grows

American Smelting & Refining Co. will spend over $1¼-million to expand its Perth Amboy, N. J., facilities for the continuous casting of bronze foundry alloys.

Two new continuous casting furnaces will boost plant capacity about 50 per cent.

Cal Metal Doubles Pipemaking

Cal Metal Pipe Corp., Baton Rouge, La., is installing a continuous mill to make resistance welded pipe for the gas, oil, water and construction industries. Production will start early in 1957.

The mill will produce standard and light weight pipe 6 to 16 in. in diameter. The expansion will raise Cal Metal's capacity to more than 100,000 tons a year.

Westinghouse Division Expands

The third expansion program at Westinghouse Electric Corp.'s Air Arm Division plant in Baltimore will add 70,000 sq ft of floor space.

Plans call for the doubling of employment within two years.

Foundry Increases Facilities

Oscar L. Olson, president, Swedish Crucible Steel Co., Detroit, calls its expansion program complete.

Increased production will result from a new 1½-ton electric furnace, automatic sand handling equipment and an additional 1200 tons of sand bin capacity.

Fansteel Builds in Oklahoma

Next month, Fansteel Metallurgical Corp., North Chicago, Ill., will start building a $6.5-million plant in Muskogee, Okla.

It will increase Fansteel's tantalum production capacity 50 per cent, its columbium capacity 150 per cent.

Martin Buys Florida Site

Glenn L. Martin Co., Baltimore, purchased a 10-square-mile site near Orlando, Fla.

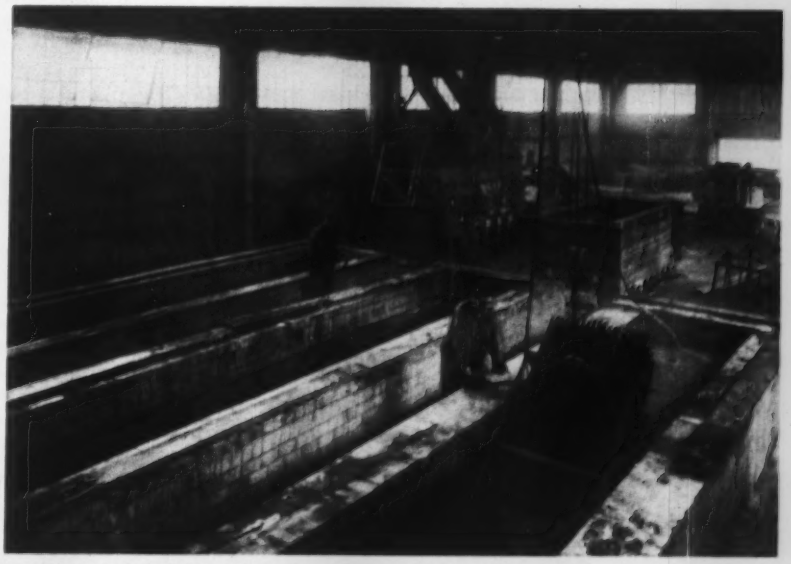
George M. Bunker, president, says the location is needed to execute Martin's commitments in electronics, nucleonics, missiles and piloted aircraft.

The company's activities in Florida include preparations for testing and launching the *Vanguard*, the multistage rocket scheduled to carry the first manmade satellite into its orbit.

Epps Adds Tube Division

Bernard Epps & Co., Los Angeles, acquired buildings and property (more than 55,000 sq ft) to house its new Tube Mfg. Division.

Epps will offer a complete manufacturing operation for welded steel tubing, ranging from ½ to 2½-in. in diameter.



Buffalo Steel Expands Galvanizing Facilities

A continuous production flow of material takes place in this new 6000-sq-ft building of Buffalo Steel Corp., Tonawanda, N. Y. The galvanizing tank is 21 ft long, 4 ft wide and 4 ft deep. Included in the department are two large acid pickling tanks, a water rinse tank and a preflow tank. Each tank is made of firebrick and lined for protection against acid reactions

Shippers' Baedeker Planned If Congress Approves

DISTRIBUTION EXECUTIVES may have their jobs eased a bit if Commerce department plans for a census of transportation go through. Officials there are convinced of the usefulness of such a project. What they have to do now is convince Congress to grant the money ($1.2 million) to do the job. Almost half would go for an ambitious survey of commodity distribution by land, air and water transportation. It would cover data on transportation and distribution by: 1. Class of carrier. 2. Market channels (retail, wholesale, interplant, etc.). 3. Major market areas served from leading production areas. 4. Volume of interregional trade within the U. S. by major class of shipper and product.

Who, Where, What, Why, When

Being looked for are answers to questions like: What are the principal channels of distribution? How much of a product is sold direct? Through wholesalers and retailers? To the government? Where is the market? How much production moves to various geographic areas? What is the relationship between producing area and sales area? What areas are most important as market outlets for certain products? How important is the size of the city? How much of a product moves by rail, air, truck, water? How much do shippers rely on their own transportation?

How Will Congress Vote?

Congress has authorized a transportation census several times, but backed out when time came to put up the money. Even so, the Commerce department is hoping that the next Congress will allow enough money to pay for at least a start. One pitch that will be used: It is important to national defense to know what transportation is available and where shortages might develop.

New Switch in Surpluses

The Defense department is kicking around a new approach to disposing of surplus property: Selling it back to its manufacturer. The idea has been tried out on the Antifriction Bearing Manufacturers Advisory Committee of the Business & Defense Services Administration. Industry representatives are said to be "definitely interested" if the items could be unscrambled and sorted as to manufacturer and be assembled in sufficient quantities to justify the unpacking, inspection and repacking operations that might be necessary. The Defense department plans to try such a program on six or so other components if they can get the first one worked out. Aim is to get the government a better return on surplus sales than is now possible with auctions and sealed bids.

Scrap Exporting Eased

The Bureau of Foreign Commerce has simplified export licensing requirements for iron and steel scrap exports. Exporters no longer have to submit bills of lading as evidence of previous shipments. And the quantity shown on an application no longer has to be limited to a single shipment on a single carrier. Exporters must still certify (except for offshore scrap and shipments to Mexico) that the scrap covered by their applications is available for export.

FTC Backs Down

The Federal Trade Commission has dismissed price discrimination charges against five material handling equipment producers. The commission's counsel states that he would be unable to prove adverse effects on competition, mainly because of the commission's dismissal of a similar complaint against Yale & Towne Mfg. Co. The five companies: Elwell-Parker Electric Co., Cleveland; Hyster Co., Portland, Oreg.; Lewis-Shepard Co., Watertown, Mass.; Clark Equipment Co., Buchanan, Mich.; and Otis Elevator Co., New York.

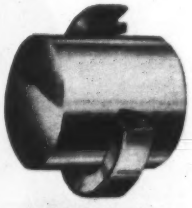
Export Trade Pushed

In fiscal 1956, the Export-Import Bank loaned $375.9 million to finance exports of U. S. equipment, commodities and services. Fifty-one new credit lines for a total of $32.8 million were granted to U. S. capital goods producers.

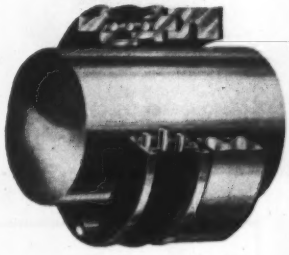
Meet Richard V. Ford: He's on loan to the government from Ford Meter Box Co., Wabash, Ind. His job there is vice president and export manager. In Washington he is director of the Water & Sewerage Industry & Utilities Division of Business & Defense Services Administration. He can be reached at the Commerce department, Room 4069. Phone STerling 3-9200, ext. 3262

C/R cooperative research

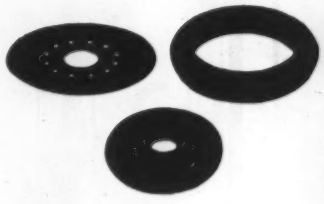
covers this wide range of products



SHAFT-TYPE OIL SEALS More than 20 types, forming over 7,500 size combinations for shafts from ¼" to 50" O.D., are available — thousands from stock. These seals are used for the vast majority of shaft sealing problems from simplest dust exclusion to high-speed, high-temperature fluid retention and foreign matter exclusion under extremely rugged operation where high sealing efficiency must be maintained over long service life.



END FACE SEALS For critical sealing problems outside the capabilities of shaft-type seals, there are C/R End Face Seals, which operate on the principle that two smooth, flat surfaces, one rotating on the other at right angles to the shaft, form a leakproof seal. They require minimum pressure to maintain face contact, create minimum friction, heat and power loss, and give unsurpassed performance under the most severe conditions.
Typical applications of C/R End Face Seals include: sealing track rollers of crawler tractors; sealing high-speed accessory drives in aircraft; sealing medium speed applications such as gear cases of washing machines, dishwashers and similar home appliances.



SIRVENE SYNTHETIC RUBBER PRODUCTS The advanced level of compounding and molding elastomers and special materials to critical tolerances achieved by C/R Sirvene Engineers is a widely established fact. They will design, compound and produce a part to your exact specifications of hardness, elasticity, and resistance to aging, temperature, oils, solvents or chemicals — with dimensional uniformity and consistent high quality, regardless of quantity. Holding to extremely close tolerances is standard procedure. A typical list of products includes oil seal packings, diaphragms, cups, boots, gaskets, plugs, impellers, valve inserts and way wipers — to name but a few. The experience and facilities available to you from C/R's Sirvene Division are unrivaled in the industry.

SIRVIS-CONPOR MECHANICAL LEATHER PRODUCTS The typical range of mechanical leather products includes oil seal packings, cups, boots, washers, gaskets, couplings and valve discs, but encompasses any part wherein high tensile strength, flexibility, high resistance to pressure, wear, shock, and vibration are desired. Cups of C/R's Conpor impregnated Sirvis leather products are operating at pressures up to 10,000 p.s.i. They are insoluble in most hydraulic oils and compatible with a wide range of other oils, solvents and gases. C/R boots of Sirvis leather, canvas, nylon or elastomer impregnated fabric can be produced in sizes two stories high or not bigger than your thumb for use in the protection of eccentric, universal or reciprocating action. Whatever your sealing or protection problem, bring it to Chicago Rawhide. C/R Engineers are constantly developing new mechanical leather designs for special and universal application.

Please write direct or contact your nearest C/R sales engineer about your problem in fluid sealing or related fields.

CHICAGO RAWHIDE MANUFACTURING CO.

Offices in 55 principal cities. See your telephone book.

In Canada: Chicago Rawhide Manufacturing Co., Ltd., Hamilton, Ontario
Export Sales: Geon International Corp., Great Neck, New York

C/R Products: C/R Shaft and End Face Seals • Sirvene (synthetic rubber) molded parts • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-metallic Gears • C/R Rawhide and nylon hammers.

C/R CHICAGO RAWHIDE

Tops in Reliable Performance

The mathematics of maintenance is rather simple. Just eliminate one hour of down time and you'll save many dollars in production. Cincinnati Milling engineers are thoroughly familiar with these simple facts of machine tool performance and have incorporated a number of features in the ML and MI lines to give them the highest degree of reliability. A few of these features and their advantages are illustrated here. And in addition, CINCINNATI® ML and MI Milling Machines are equipped to handle a wide variety of operations:

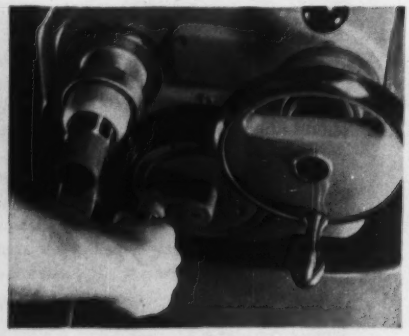
16 feeds, ¼" to 30" per min. Higher range optional
16 spindle speeds, 25 to 1500 rpm. Lower and higher ranges optional
Single crank selection of spindle speeds
Single crank selection of feeds
Independent, directional controls
Available in the styles desired by your shop
Attachments to suit your needs

CINCINNATI ML and MI Milling Machines are unquestionably your best buy for medium duty variety milling or both variety and production milling. Want more information? Look in Sweet's Machine Tool Catalog, or write for a copy of catalog No. M-1916.

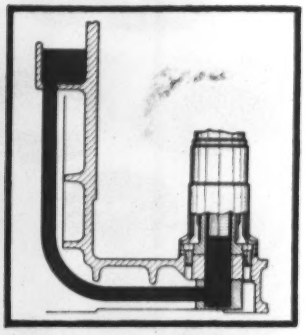
CINCINNATI No. 2 MI MILLING MACHINE

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

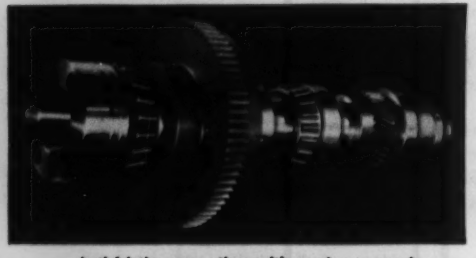
Automatic Table Cycle machines (Plain and Vertical styles) combine high production and toolroom features



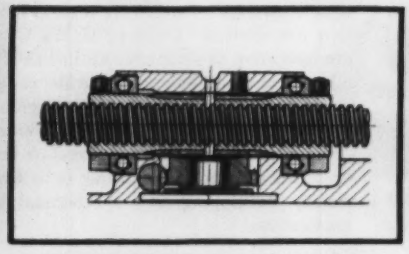
Feed rates are quickly and easily selected with a single crank-type control at the front of the knee



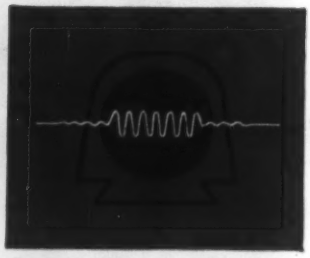
Vertical screw is submerged in a bath of oil from its own reservoir, assuring long, accurate life



Anti-friction mounting with center support for the heavy spindle assembly, smoothly transmits maximum cutting power



Automatic backlash device enables the operator to feed the table to the right or left as desired.

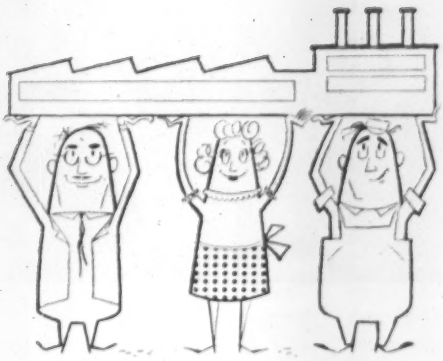


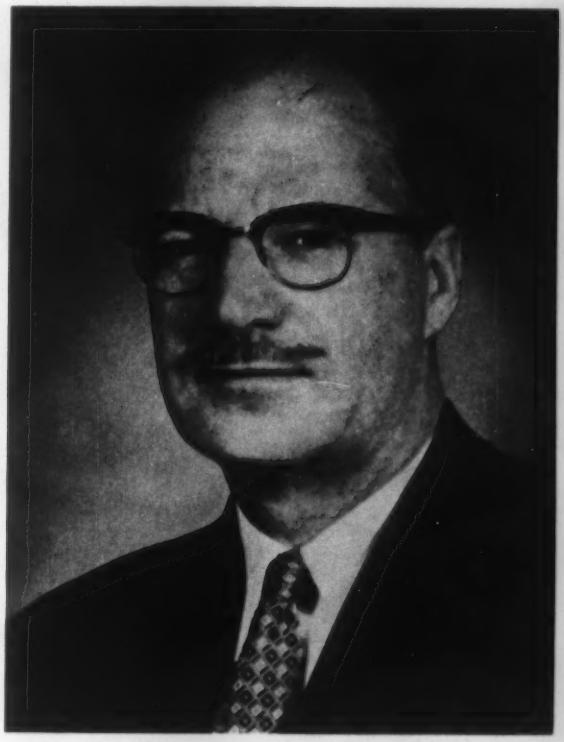
Dynapoise overarm smooths out the cutting action; provides straight-edge alignment for arbor supports

CINCINNATI

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES
HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID • GRINDING WHEELS





A. G. Patterson: People Make Business

"I LIKE to think of an organization as a means by which many people accomplish together those things which as individuals acting alone they could not accomplish."

That philosophy of business belongs to A. Gordon Patterson, 53, president of Square D Co., Detroit. He gives it more than lip service.

Last Jan. 1, Square D, manufacturer of products used to distribute and control electricity, gained dual benefits when it merged with Electric Controller & Mfg. Co., Cleveland. Not only did it broaden its product line with the addition of Electric Controller's large capacity motor controls and related devices but it also got a new president.

Mr. Patterson, former head of the Cleveland firm, relates that during merger talks the two companies looked at the usual statistics—earnings, market price of stocks, markets and products. "Yet, most of all, we thought of people. We asked ourselves how will the men and women in our organization fare in the plans and scope of the larger combination?"

Path to Profits — To this president, people make the business. Management has a responsibility to the individual to make each man's job in the organization a fulfilling part of his life. "We believe that every responsible citizen has the will to work. This is encouraged by good working conditions, respect for the individual dignity of the worker and by the workman's approval of the company's policies and its role in society," he says. "If this philosophy implies weighty responsibilities to our society, there are commensurate rewards for those who discharge these responsibilities. Among these rewards are good old profits."

Mr. Patterson is the son of Presbyterian missionaries. He got much of his education (degrees in business administration and law) the hard way—taking night courses while earning a living. Before joining Electric Controller as treasurer in 1944, he held positions in several divisions of U. S. Steel Corp. In 1952, he became president of the Cleveland company, where about one-third of the employees were stockholders. The merger puts him at the head of a $75-million business.

Ford Motor Co.

'Specials' given top billing by builders in . . .

Machine Tools' New Look

THE machine tool business is undergoing a three-way transformation:

1. Established builders of standard machine tools are moving steadily into the special machine tool field.

2. Established builders of special tools are paying more attention to new markets—though the auto industry is still their bread and butter.

3. Many new companies are coming into the special tool business. They are spurring technological progress in the business machinery, farm equipment, valve, heat exchanger and aircraft engine industries. The sphere of influence even reaches such unlikely candidates as the wood pulp industry.

Definition — What are special machine tools? Who makes them?

The out and out special is designed from the ground up to do a given set of operations on a given part. The crankshaft machining line illustrated is an example. Some machine tool builders produce only specials like these.

At the other extreme, there's the standard lathe, equipped with tooling by the builder for a specific job. Between the two extremes, there's a vast twilight area. Results: Probably every one of the 400-odd U. S. machine tool builders has made something it would call a special, probably every one will make more.

Cases—Take a look at a firm (Norton Co., Worcester, Mass.) that's typical among builders of standard tools. R. D. Lawson, vice president - sales manager, would probably prefer to call what's happening evolution rather than transformation. But he notes that 35 per cent of the company's shipments can be classified as specials, and that this percentage is increasing.

Most of the special volume, he points out, is in standard machines adapted by special tooling to do a specific job faster and better. Mr. Lawson adds that most of Norton's output of specials goes to the auto industry. Why? "The auto producers control their designs, can afford to gamble on expensive, special-purpose tooling. That's why there's still a lot to be done with the smaller parts, like carburetors, which component suppliers traditionally make. They can't afford to take the chance of a new line this year—no contract the next."

This twist of business economics, notes Mr. Lawson, is one of the big reasons auto makers have been pulling component business back into their own plants during the last few years. For the special tool builder, it's both a design and a sales challenge. Equipment has to be built that can be changed over at less cost; customers have to be convinced that if they don't curb production costs.

they won't get the contracts.

Specials—The auto industry was the father of special machine tools. In the early days of specials, makers shipped virtually all their output to auto firms. Builders like Cross Co. and Snyder Tool & Engineering Co., both of Detroit, and W. F. & John Barnes Co., Rockford, Ill., still rely on auto firms for the bulk of their business. Cross and Snyder currently are shipping about 80 per cent of their production to automotive, Barnes about 60 per cent. Those percentages are a little higher than usual in the last couple of years because of auto makers' heavy capital spending.

The two Detroiters are stepping up their output. Snyder, whose shipments have been running fairly steady since 1954, hopes to almost double shipments next year. Cross, also at capacity, is engaged in a program that will double capacity by 1959. Newer markets for these builders include farm equipment, aircraft engine and appliance makers. Though diversification will continue, it's a good bet that for the next five years at least, the auto industry will take at least 50 per cent of total special machinery shipments.

New Markets—There are cogent reasons why a builder shouldn't rely too heavily on the auto industry. As self-protection against a feast or famine cycle, builders have developed a number of bellows. Says Howard N. Maynard, Snyder's prexy: "One or two buying programs can make a lot of difference to business volume. It's unwise to expand or contract facilities too much. We use subcontracting as our bellows, including subcontracting engineering work where necessary."

One guess on the engineering cost component of a special machine tool: From 10 to 25 per cent of the builder's cost. Any time you build a machine that tips, turns or rotates the workpiece, look for 25 per cent engineering costs.

Because each machine involves a big design job, engineering is a special problem for these builders. Some use contract engineering firms to get around the shortage of help. Others, like Barnes, have their own electrical, hydraulic and tool engineers in addition to the regular mechanical group.

The problems involved in the design of new machinery to do new jobs in new industries have brought many new companies into the business.

Example—Zagar Tool Co., Cleveland, has been building special machine tools for only eight years. It entered the business because it saw places where its specialty—multiple drill heads—could be used to cut production costs.

Zagar is doing only about 5 per cent of its volume with the auto industry. The bulk is spread among four or five other fields. Its goal is to become a design and assembly organization.

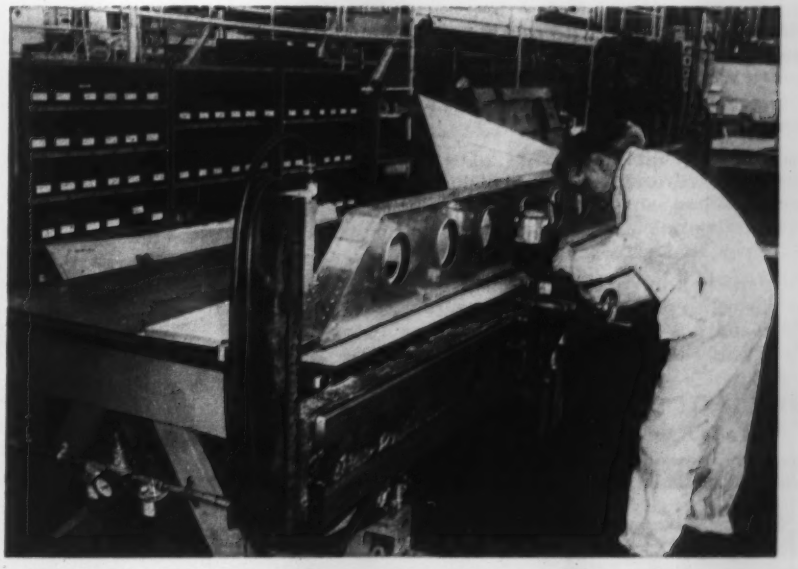
Challenge—Some of the difficulties which face the newcomer to the special machine tool field are pointed up by Mr. Zagar: "It's not just the engineering shortage that's rough, but also the complexity of engineering skills demanded. One customer is asking us to build a machine to drill and tap holes, run in studs, assemble stampings onto the studs, then put nuts on top of the whole thing and tighten them down. We started as an expert in drilling problems. Now we have to solve milling and other machine tool problems."

Common Ground — All builders of special machine tools are making progress toward standardization. Another comparative newcomer to the field, Michigan Drill Head Co., Detroit, offers a good example of the payoff.

Says Thomas Farron, assistant to the president: "In the last eight months, we've had a terrific upsurge in new business. Last year's machine tool show was the first time that builders got a chance to show the buying public what could be done with standard components."

Spread—There are many ideas on the key to success in the special machine tool field. One northeastern Ohio company, for example, believes that bigness is a disadvantage. "Close relationship with customers is essential (special machine tool builders like to have the customer's line operators and maintenance crews in their shops during final assembly and break-in periods).

Moves of new or established firms into specials are partly assured success simply because of the surging demand for that type equipment. "We are the mechanics," says one builder, "helping to make possible a long-term revolution in America's manufacturing methods."



Automatic Trimming Cuts Labor Time 60 Per Cent

Panels and training edges are trimmed automatically at Martin Co., Baltimore. A router is used to trim parts held in place by fixture. Panels used to be scribed and cut, then hand filed

How Great Lakes Steel *launches* quality

You're at 400 feet, banking for a good close look at the unloading operation of the *Ernest T. Weir*. She's packed to the gunwales, stem to stern, with ore—tons of iron-bearing food for Great Lakes hungry blast furnaces.

What's this got to do with turning out top-quality steel at Great Lakes? Plenty! For quality pig iron can only come from quality raw materials—like the *Weir's* rich cargo. And, of course, quality pig iron is the very backbone of top-quality steel.

Control of quality at Great Lakes begins right at the mines. In fact, each ore source is picked with painstaking care. Then, repeated checks in the mines—*double checks* here at the unloading docks—put the quality of Great Lakes raw materials beyond question!

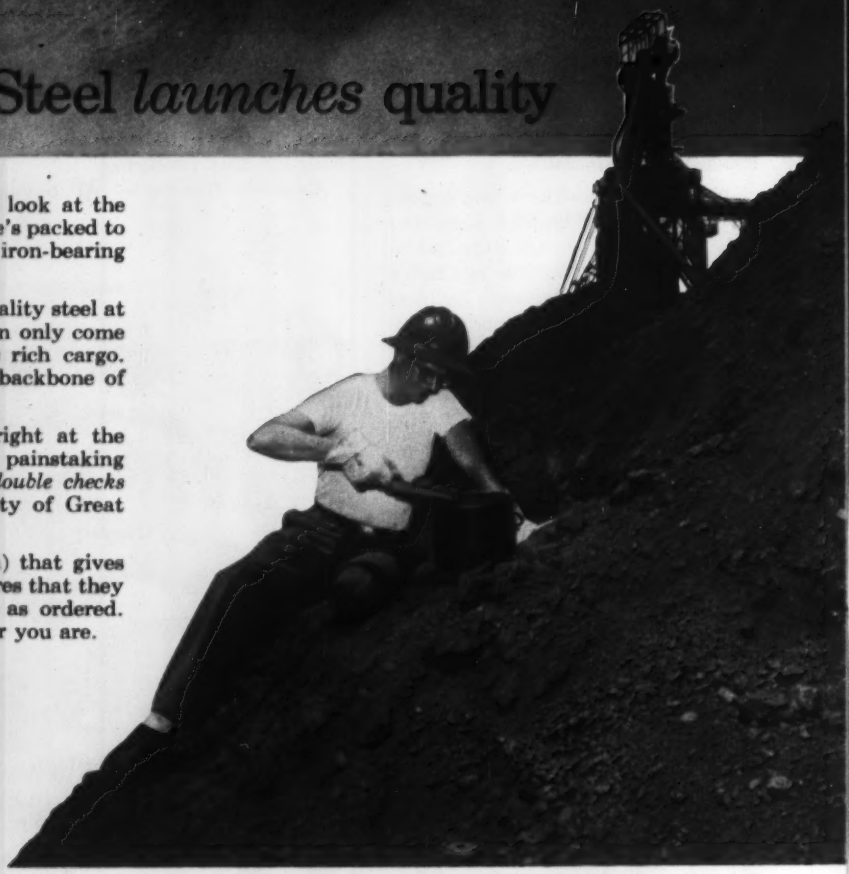
It's that kind of control (from start to finish) that gives our flat-rolled products uniform quality—assures that they will reach our customers exactly when and as ordered. We're ready to talk your steel needs whenever you are.

GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan • A Unit of

NATIONAL STEEL CORPORATION

District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.



TO ASSURE TOP-QUALITY OPEN-HEARTH STEEL . . . iron ore (shown stockpiled here), coal and limestone—all of known source and quality—are sampled and tested over and over again by Great Lakes Steel raw material analysts.

Fourth Quarter U. S. Passenger Car Production*

(In thousands)

	October	November	December	Total
General Motors	145	280	320	745
Ford Motor Co.	130	160	195	485
Chrysler Corp.	110	125	135	370
American Motors Corp.	8	14	17	39
Studebaker-Packard Corp.	4	11	14	29
Total	397	590	681	1,668

*Estimated by STEEL.

Autos Look at Last Quarter

Expectations: An orderly cleanup of 1956 models in dealers' stocks. Wide public acceptance of the 1957 models. The fourth quarter should set the pace for next year

AUTO MAKERS should turn out 1.7 million cars in the fourth quarter. This scheduling will bring 1956 total production right between the 5.8 million and 6 million sales and output marks predicted by General Motors Corp. and Ford Motor Co. The production total through September is just above 4.2 million.

Latest factory sales totals compiled by the Automobile Manufacturers Association indicate 3.5 million passenger cars had been sold domestically by the end of July. Unofficial sales reports for August and September bring the total for nine months to 4.5 million. This doesn't include overseas, military or Jeep sales (there's a statistical struggle as to whether Jeeps should be counted in passenger car or truck production columns).

No Discrepancy—On the surface, it would appear that auto showrooms are bare, but don't forget to add in the 800,000-plus stock level dealers have been working off since the first of the year. *Ward's Automotive Reports* figures it's now at the 270,000 mark.

Most of the 1957 models will be on salesroom floors by mid-November. By that time, dealers will have cleaned out this year's hangover. Several Detroit dealers report they already are out of 1956 cars and are soliciting orders for 1957 models. *Ward's* says the industry will start January with dealer stocks between 525,000 and 625,000.

Trucks — Heavier vehicles also look for a brisk fourth quarter. Truck production, totaling about 840,000 so far, is programmed at 250,000 units for the last quarter. This will bring 1956 output just over a million vehicles, 12 per cent under 1955's.

Sales, which more closely parallel output in the truck field, currently are estimated at 835,000 vehicles for domestic and foreign markets. Price boosts, due in the last quarter, won't slow buying, say producers. Look for truck sales to tie with output just over the million mark.

Prospects — Next year, truckbuilders are looking for substantially better production as the federal highway program gets under way. Unofficial estimates from two independent producers put 1957 truck output between 1.2 million and 1.3 million. A 15 to 18 per cent increase is anticipated in dump trucks and similar rolling construction equipment.

Lightweight trucks in 1957 (quarter and half ton), will sport a variety of gadgets aimed at increasing comfort and handling. Some will look as spiffy as new autos with two-tone paint jobs, power steering assemblies and more automatic transmissions.

Employment—Work forces are building up, too, as 1957 models start rolling off assembly lines. The five carbuilders figure there are about 600,000 hourly employees on the payrolls now. It should jump another 30,000 or more by the end of the year.

This is happy news for auto makers who caught a heavier-than-usual pasting from the union this spring as the slump in sales forced companies to cut back work forces. John Bugas, industrial relations vice president, Ford Motor Co., says the firm's hourly work force will be 135,000 by mid-October and probably will reach 140,000 by the end of the year.

Estimates — GM has no recent employment estimate. One of the corporation's officers unofficially reports the current hourly work force at 360,000. He says it will increase rapidly as GM's model change-overs are completed and is likely to reach 375,000 by the end of November.

Chrysler has averaged 92,000 workers this year, but is picking up another 10,000 now that its model change-overs are finished. American Motors Corp. says its realistic top employment figure is about 12,000. Studebaker-Packard Corp., minus some 4800 workers chopped from the rolls after Packard's demise in Detroit, hopes to hold its 1957 production force to

(Material in this department is protected by copyright, and its use in any form without permission is prohibited.)

GMC Unveils Rescue Truck

This industrial or civil defense emergency vehicle is equipped with two and four wheel drive, automatic transmission and front end winch. It holds eight persons; is powered by a 270 cu in., 6 cylinder engine (130 hp)

less than 10,000. It's currently about 7500.

Confidence — Looking beyond fourth quarter and into next year, the industry feels sure that demand for 1957 models will mount. Predictions already hint at a 6.8 million to 7-million car year.

J. F. Wolfram, Oldsmobile general manager and GM vice president, says buyers will spend more than $17 billion on new cars next year. This year, the public is paying out about $13.8 billion. The last quarter of 1956 should pretty well outline the plot for 1957.

Reveals Fuel Injection

A gasoline fuel injection system has been developed by the Marvel-Schebler Products Division, Borg-Warner Corp., Chicago.

A model of the unit was exhibited at the Society of Automotive Engineers' national tractor meeting, Milwaukee. Company officials say no firm orders for the device have come in. Production methods still need refinement.

The Borg system is a metered unit which injects fuel into the intake manifold just before it enters the cylinders. Air meets it at the combustion chamber opening.

Like most metered systems, the B-W layout requires costly engineering, a factor not likely to enhance its sales chances. B-W doesn't comment on price, but similar units run $100 and up. Constant flow injectors are a better bet pricewise (see STEEL, July 30, p. 63).

The Borg system is well designed and operates efficiently. Engineers report: "In a conventional engine modified for fuel injection, power can be increased 15 to 20 per cent."

Another company recently has shown interest in a similar setup. Holley Carburetor Co., Detroit, now holds license rights to the Lucas FI system, built and sold overseas by Joseph Lucas Industries, England.

Ford is one of Holley's big customers. It's rumored an FI unit will appear on at least one Ford line later in '57. Zenith Carburetor Division, Bendix Aviation Corp., Detroit, also is supposed to announce a fuel injector in October.

U. S. Auto Output

Passenger Only

	1956	1955
January	612,079	659,508
February	555,596	675,495
March	575,234	794,015
April	547,766	753,851
May	471,533	724,892
June	430,279	649,393
July	448,804	659,763
August	401,997†	614,493
8 Mo. Total	4,043,288†	5,531,410
September		461,591
October		517,813
November		749,061
December		682,257
Total		7,942,132

Week Ended	1956	1955
Aug. 18	98,348	138,209
Aug. 25	69,977	129,591
Sept. 1	58,233	85,851
Sept. 8	47,771	79,366
Sept. 15	64,414†	122,263
Sept. 22	66,000*	123,109

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

S-P Hits Comeback Trail

Studebaker-Packard Corp. has $50 million in working capital, which Harold Churchill, president, says is enough to operate on through 1957 and pay tooling costs for the 1958 Packard and Studebaker cars.

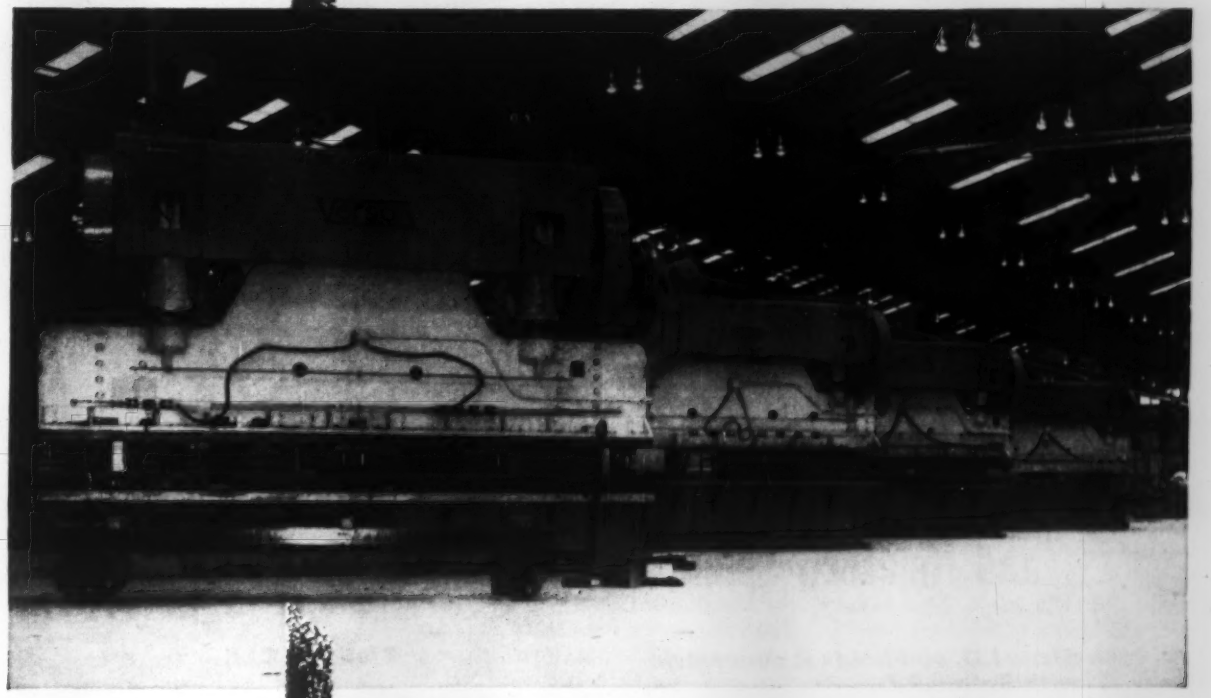
Mr. Churchill announces there will be a supercharger on the 1957 Golden Hawk cars and the company's nonslip differential will be optional for all lines. Studebaker will add a four-door station wagon and a heavier duty truck to its models. The cars will be introduced Nov. 1.

A sales goal of 1.58 per cent of the market will make money for S-P. Says Mr. Churchill: "Our forecasters expect domestic car sales in 1957 to be 6.5 million units (conservatively). A 1.58 per cent share of that total represents 103,000 cars."

The volume item in Studebaker's line will be its Hawk series. Although the company officially is scheduling 25 per cent of its output in the sports car, one sales executive privately said he was anticipating Hawk output of 35 per cent. Rumored price on the Golden Hawk is $4500.

Little attention has been paid to Mr. Churchill's remark that in consolidating all operations in South Bend, much emphasis will be placed on new material handling procedures. It's understood Studebaker, working with a five-story plant, hopes to mechanize its assembly line more completely than anyone else in the industry. These efforts will bear watching.

Verson design, engineering and craftsmanship combine versatility with efficiency



Catalog B-55 gives design details and specifications for all Verson Press Brakes. Write for your copy, today.

This line-up of Verson Major Press Brakes is in the plant of Butler Manufacturing Company (Canada), Ltd., subsidiary of Butler Manufacturing Company. Ranging in capacity from 190 to 450 tons, these Verson Press Brakes form a production unit that combines the versatility necessary for multi-purpose manufacture with the efficiency standards necessary for profitable operation. The line currently produces special corrugated sheet steel and structural members for commercial type prefabricated steel buildings.

Verson Major Series Press Brakes, as shown here, are designed for the big jobs and represent the ultimate in strength, rigidity, accuracy and power. Their advanced design includes such features as herringbone main gears, spring loaded mechanically actuated shoe type brakes, ram adjustment motor with totally enclosed worm gear, rugged "L" type gibbing and allsteel welded frame to maintain constant alignment of bed, ram and housing, high pressure lubrication system and many others. These are the features that enable them to provide the utmost in performance, precision, production.

There are Verson Brakes for your smallest or your largest job. Write for complete information, or send an outline of your needs for specific information. Verson engineers, backed by over twenty-five years of press brake manufacturing experience, will be happy to help you.

A Verson Press for every job from 60 tons up.

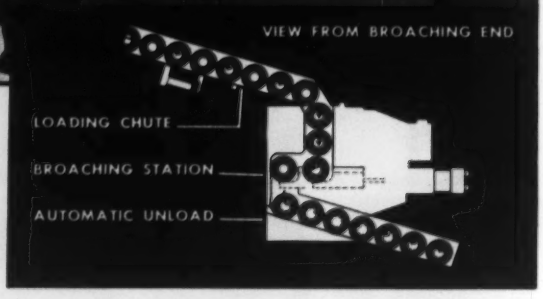
Verson

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9318 S. KENWOOD AVENUE, CHICAGO 19, ILLINOIS • SO. LAMAR AT LEDBETTER DRIVE, DALLAS, TEXAS

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES



Detroit Broach Horizontal Machine Broaches I.D. and Nineteen Splines

- ***Sizes I.D. and holds it concentric with Spline P.D.***
- ***Completely automatic 8-second cycle***

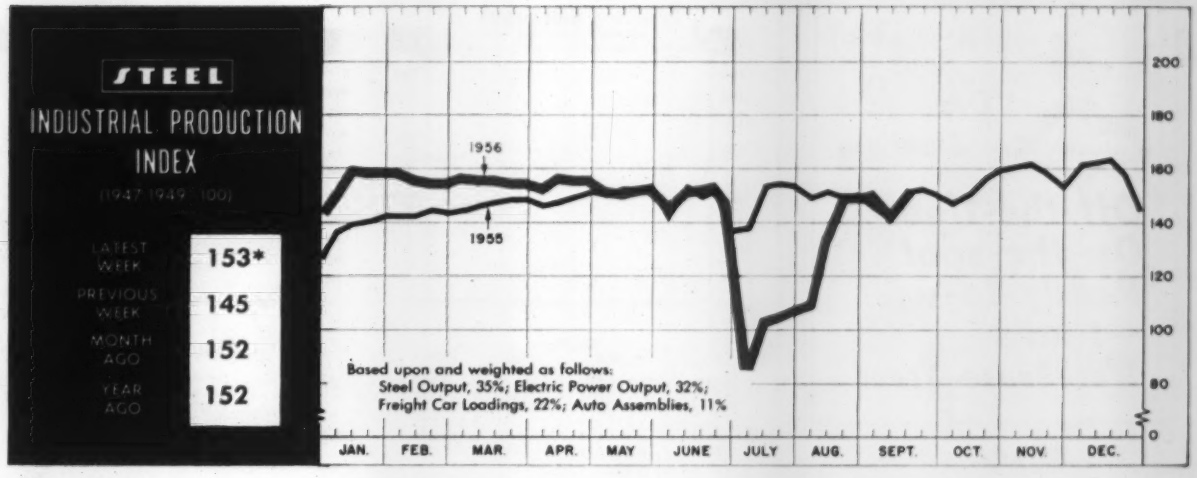
This 3-ton, 36-inch stroke Detroit Horizontal Broaching Machine is inexpensive, fast, and offers automatic operation, tool handling and work ejection. While manual chute loading is illustrated, optional automatic loading is easily accomplished.

During its 8-second automatic cycle the machine accurately sizes the I.D. and broaches 19 precision internal splines, keeping them 100% concentric with the I.D. Thus, subsequent operations are performed more easily and economically because of simplified work location and improved accuracy.

This simplicity with high production is typical of Detroit Broach & Machine Company engineering. Detroit builds every size and type of broaching machine, and will automate and tool them to fit your needs. Discuss *your* production problem with a Detroit field engineer, or send us details . . . today.

THE CYCLE

1. Part drops through chute into "LOAD" position
2. Loader pushes part into broaching position
3. Loading signals automatic tool handling mechanism to move broach in to engage broach puller
4. Broach is pulled through work to end of pre-set stroke
5. Loader returns, broached part drops into unloading chute, next part drops into "LOAD" position
6. Returned loader signals machine to return broach to tool handling mechanism.
7. Machine slide stops, tool handling mechanism returns broach to "START" position
8. Cycle repeats . . . EVERY 8 SECONDS!



*Week ended Sept. 15.

Best Quarter Just Around the Corner

THE BIGGEST quarter in the history of the country is on the way. For metalworking, it means sales of about $35¼-billion, bringing the year's total close to a record $138 billion.

The big difference between the third and fourth quarters will be in the auto industry. For nine months, that segment of metalworking has been the big disappointment. Nevertheless, industrial activity in each quarter, except for the strike-bound third, has shown improvement over the preceding period. From now on, there will be no holding back of Detroit's assembly lines.

Host of Records—The pickup in autos will have a startling effect on several of the most important business indicators. It will be one of the big factors in lifting gross national product to a new high of $412 billion (annual rate) for the next three months (see STEEL, Sept. 3, p. 45). It will push the Federal Reserve Board's industrial production index past the record of 144 (1947-49=100) set last December. And it will raise STEEL's production index above the record 164 (1947-49=100) established during the Dec. 17, 1955, week.

This will not be a single-handed effort on the part of the auto manufacturers. Practically all of American industry will be going at an equally fast pace. This basic strength has been building up all year. Even during the steel strike, metal fabricating made significant gains. And despite the slowdown in autos, the FRB's index for this segment of industry rose in August to a new high of 174 per cent of the base period.

Up to Par—Combined with the recovery in steel (which was not complete when this index was computed) the net result was a mark of 141 on the FRB's industrial production index for August. This was on a par with June.

The high level of sales, new orders and backlogs also assures industry of these new records. New orders slipped to $26.1 billion in

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,452[1]	2,477	2,320
Electric Power Distributed (million kw-hr)	11,400[1]	10,955	10,580
Bituminous Coal Output (1000 tons)	8,725[1]	10,150	8,519
Petroleum Production (daily avg—1000 bbl)	7,025[1]	7,037	6,684
Construction Volume (*ENR*—millions)	$372.5	$243.9	$381.2
Auto, Truck Output, U. S., Canada (*Ward's*)	85,731[1]	66,562	146,484
TRADE			
Freight Car Loadings (1000 cars)	775[1]	680	822
Business Failures (Dun & Bradstreet)	196	237	205
Currency in Circulation (millions)[3]	$30,910	$30,787	$30,520
Dept. Store Sales (changes from year ago)[3]	+4%	+2%	+11%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$19,510	17,004	$19,497
Federal Gross Debt (billions)	$275.4	$275.6	$277.9
Bond Volume, NYSE (millions)	$21.5	$15.6	$29.4
Stocks Sales, NYSE (thousands of shares)	9,835	7,154	13,102
Loans and Investments (billions)[4]	$85.7	$85.6	$84.2
U. S. Govt. Obligations Held (billions)[4]	$26.5	$26.6	$30.8
PRICES			
STEEL's Finished Steel Price Index[5]	225.71	225.71	207.63
STEEL's Nonferrous Metal Price Index[6]	266.1	262.7	260.1
All Commodities[7]	115.1	114.8	111.4
Commodities Other Than Farm & Foods[7]	122.6	122.4	117.9

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

Says "Dependable Dan"—

Off-the-floor On-the-spot Ready-to-use —that's Warehouse Steel

For helpful action

RELIANCE STEEL
DIV. DETROIT STEEL CORP.
General Office: Detroit 9, Mich.

PLANTS
CHICAGO 8 ..... CAnal 6-2442
CLEVELAND 27 .... VUlcan 3-3600
DETROIT 28 ..... WEbster 3-5866
HAMDEN, CONN. .. STate 7-5781

CUSTOMER "REP" OFFICES:
Dayton, O., Cedar Rapids, Ia.
Des Moines, Ia., Grand Rapids, Mich.
Indianapolis, Ind., Jackson, Mich.
Milwaukee, Wis., New York, N.Y.
Rochester, N.Y., Rock Island, Ill.
St. Louis, Mo., Toledo, O.
Worcester, Mass.

Processors and Distributors

RELIANCE
Job-Fitted
READY-TO-USE
SHEET and STRIP STEEL

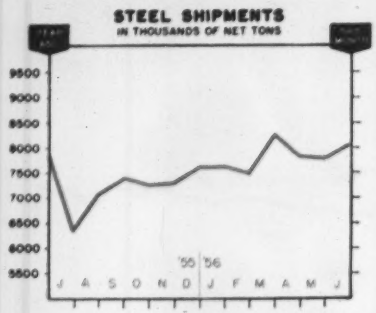
COLD ROLLED STRIP
Coils • Cut Lengths • All Tempers
FLAT CR SPRING STEEL*
Soft Annealed
Hard Rolled Untempered
Coils • Cut Lengths
SHEETS
Cold Rolled • Hot Rolled
Hot Rolled Pickled
Galvanized • Long Terne

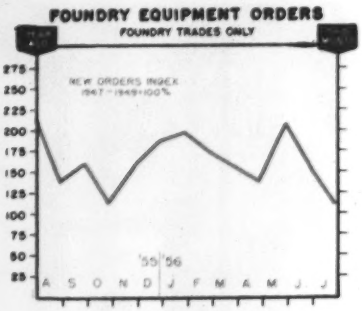
Experience-Fitted to Your Job

*Stocked only in Detroit

COPYRIGHT 1956

THE BUSINESS TREND





	Net Tons 1956	1955	1954
Jan.	7,587,870	6,009,958	5,727,600
Feb.	7,468,393	6,119,900	5,364,978
Mar.	8,255,824	7,268,795	5,583,690
Apr.	7,783,873	7,279,321	5,287,972
May	7,764,776	7,540,889	5,423,168
June	8,077,805	7,770,213	5,887,488
July	.....	6,250,597	4,490,179
Aug.	.....	7,053,615	4,681,242
Sept.	.....	7,378,247	5,004,222
Oct.	.....	7,216,821	5,035,364
Nov.	.....	7,247,994	5,240,209
Dec.	.....	7,580,943	5,448,649

American Iron & Steel Institute.
Charts copyright, 1956, STEEL.

	1956	1955	1954
Jan.	195.6	81.0	173.8
Feb.	169.0	90.4	99.9
Mar.	152.7	163.6	82.7
Apr.	135.2	178.6	125.3
May	207.0	145.7	80.8
June	156.7	186.8	86.4
July	110.3	213.4	68.8
Aug.	....	134.0	75.6
Sept.	....	156.7	68.3
Oct.	....	108.6	147.5
Nov.	....	154.4	61.4
Dec.	....	183.9	113.9

Foundry Equipment Mfrs. Assn.

July (from $27.7 billion in June), but this was accounted for almost wholly by the steel strike. August and September have returned to the high plane that prevailed in prestrike months. New orders ($27.1 billion) showed the customary summer slump in July and are making the comeback now. Unfilled orders continued to pile up during the vacation period and stood at almost $60.5 billion in July, according to latest Commerce department figures.

New Index Record Coming

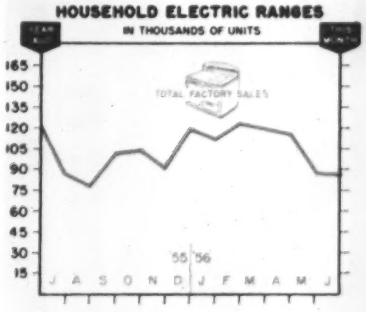
STEEL's industrial production index is once again on firm footing, after the Labor Day rest, and registers a preliminary 153 of the base period for the week ended Sept. 15. That's the best level since the 155 chalked up during the week ended June 23. The significant point is that the index made it back up during the auto industry's model change-over period.

Here's what lies ahead for the index and its components. Auto production will show little change until General Motors Corp. gets into 1957 model production. That should be during the first half of October, with the unit count building up to the top level in November. The industry plans to produce no less than 1.7 million cars during the fourth quarter. That means the bulk of them will roll off the production line during the last two months. Some weeks will see total output of about 200,000 units, which would add about 12 points to this week's index total.

Output of electric power builds up to a seasonal peak during the weeks immediately preceding Christmas. Last year, the 1956 record was 11.614 billion kw-hr during the week ended Dec. 17. That mark has already been topped this year (11.794 billion kw-hr, week ended Aug. 18). The record will be close to 11.85 billion kw-hr, which would add about 3 points to the present index reading.

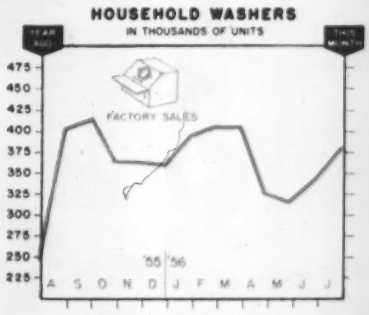
Steel production will not go too much higher. It is near Jan. 1, 1956, capacity. With new capacity brought in since then, the industry could operate at about 103 per cent before the year is out—and possibly will. That would add about 2 points to the current reading.

For the remainder of the year, freight car loadings will be the only depressing factor in the index. After hitting a peak in Oc-



	Total Factory Sales—Units 1956	1955	1954
Jan.	110,140	136,663	101,870
Feb.	122,514	127,188	109,647
Mar.	117,544	130,180	115,393
Apr.	114,619	108,619	92,751
May	85,977	109,263	82,649
June	84,562	105,088	85 854
July	85,629	80,017
Aug.	76,158	75,907
Sept.	101,100	99,611
Oct.	103,610	84,321
Nov.	88,290	79,340
Dec.	118,161	85,033
Totals	1,289,949	1,092,393

National Electrical Mfrs. Assn.



	Factory Sales—Units 1956	1955	1954
Jan.	393,717	357,354	249,956
Feb.	405,631	353,214	295,171
Mar.	405,744	370,555	307,862
Apr.	324,238	313 461	258,712
May	315,249	341,759	246,944
June	340,235	354,470	303,455
July	380,172	245,879	242,863
Aug.	403,770	293,243
Sept.	414,919	379,666
Oct.	362,335	339,169
Nov.	361,341	308,368
Dec.	357,503	264,803
Totals	4,236 500	3,490,212

American Home Laundry Mfrs. Assn.

tober, the railroads usually experience a decline in loadings because of reduced ore traffic and other seasonal factors. This year, the reduction may come later than usual because of the loss of stockpile ore during the steel strike and ore boat strikes. By December, when the other elements are peaking, this one will be down as much as 3 or 4 points.

STEEL's index will possibly hit a record 166 sometime in December.

Better Construction Ahead

F. W. Dodge Corp. reports that even though contract awards for future construction are declining, they are still ahead of year-ago totals by a comfortable margin. The August total for 37 eastern states is $2,068,754,000, about 9 per cent above the figure for August, 1955. Awards for each major category are the highest ever recorded for that month. Even residential awards are ahead of last year's, but larger homes and higher prices account for that. The number of housing units is down 9 per cent.

Housing starts made some advance in August on a seasonally adjusted basis. Though the number held even with July's 101,000, the Bureau of Labor Statistics adjusted the figure to an annual rate of 1,110,000 units, up 40,000 from June and July.

The Associated General Contractors of America Inc. reports in its midyear survey that a majority of its members expects continued increases in all major categories of construction in the next six months. Better than half of the contractors see increases in building and heavy construction, while an overwhelming 87.5 per cent expect increases in highway building. Members from 41 states report a shortage in structural steel. Shortages and slow deliveries of other steel products and cement have delayed many projects by several months.

Price Rise Confirmed

The Bureau of Labor Statistics reports that wholesale prices for all commodities advanced from 114.0 in July to 114.6 per cent (1947-49 = 100) in August. All the increase was accounted for by a 1 percentage point rise in commodities other than farm products and foods. Metals and metal products led the way after price increases followed the strike. Look for similar advances during the next few months.

Let's Get Down To Facts About CLAIMS—

Yes, we could run a full page telling you why our Products are better, but we prefer to have

HI-AMP®
ELECTRODE HOLDERS

prove their advantages by actual test with others—that's why we say, ask your Dealer to demonstrate a HI-AMP and you'll "see" why Welders everywhere prefer it.

Get All the Facts about HI-AMP Products — Send for a copy of "Your HI-AMP Messenger"

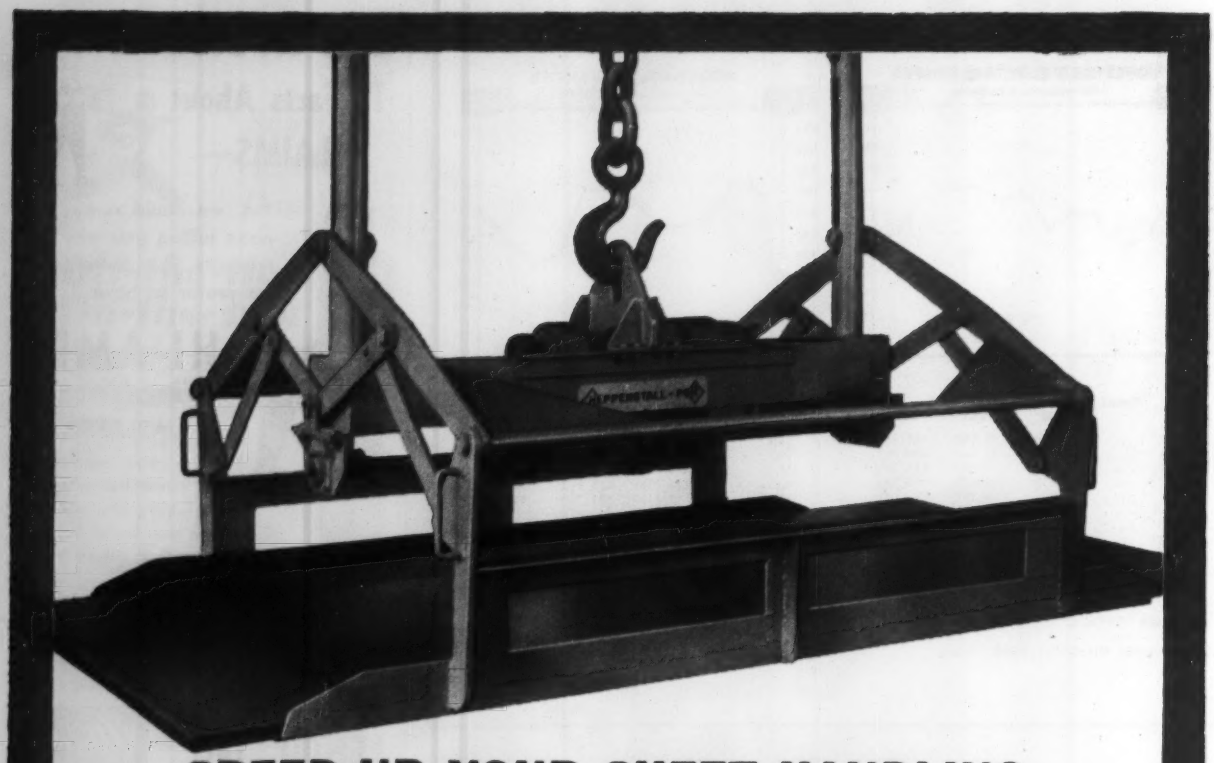
LENCO, Inc.
(Formerly Wagner Mfg. Co., Inc.)
JACKSON, MISSOURI

Weld with HI-AMP

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
CHATTANOOGA 2, TENN.

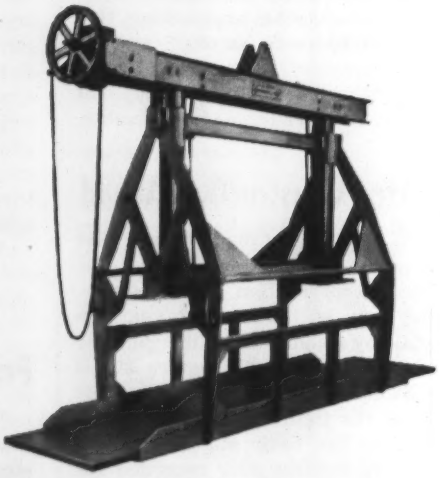


SPEED-UP YOUR SHEET HANDLING... MAKE IT SAFER... REDUCE COSTS with the new Heppenstall Sheet Lifter

This latest addition to the Heppenstall line of tongs has remarkable safety and ease-of-operation features that will save you both time and expense. Its design and construction solve many problems in sheet handling, and offer you these important advantages:

1. **No manual adjustment required for sheets of different widths.**
2. **Decreases sheet damage because of straight line motion of lifting arms.**
3. **Cannot lose load because of self-locking brake.**
4. **Available in hand or motor operated models.**
5. **Unlimited capacities.**
6. **End Grabs for use with very wide or very long sheets can be added as optional equipment.**
7. **Designed to fit any crane block and hook equipment.**

STRAIGHT LINE MOTION OF GRABS. There is no up and down arc . . . vertical members remain vertical and the lifting angle moves in and out parallel to the floor. This action greatly reduces the possibility of damage to the sheets.



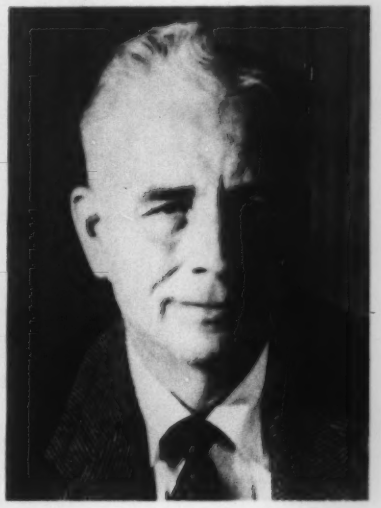
MANUALLY OPERATED SHEET LIFTER: Available with either chain or wheel operation.

TONGS FOR EVERY LIFTING PROBLEM

HEPPENSTALL COMPANY

NEW BRIGHTON, PA.

TERENCE CAFFREY
. . . Davey Compressor div. chief eng.



BEN A. SWENNES
. . . Ingersoll Kalamazoo eng. director

JACK P. ANDERSON
. . . Lunkenheimer chief industrial eng.

Terence Caffrey was made chief engineer, air compressor division, **Davey Compressor Co.**, Kent, O. He joined the firm in 1954 and previously was a designer of compressors and pneumatic mechanisms, Alfred Bullows & Sons Co.

Richard O. A. Petersen was elected president, **Virginia Metal Products Inc.**, Orange, Va. **Robert M. Drysdale**, who resigned as president, will continue as a director and member of the executive committee. Mr. Petersen was with Booz, Allen & Hamilton, management consulting firm.

Frank C. Hawk was made general manager of **Bohn Aluminum & Brass Corp.'s** new Betz Division in Danville, Ill.

Gordon E. Keim was elected president and general manager, **Philadelphia Bronze & Brass Corp.**, Philadelphia, subsidiary, P. R. Mallory & Co. Inc. He succeeds **W. D. Bryden**, resigned. **Harold T. Hunter**, sales manager since Jan. 1, was elected secretary. **Samuel P. Archino** was elected treasurer.

Hank Bryk joined **Alloy Precision Castings Co.**, Cleveland, as special assistant to the executive vice president and will be in charge of the lost wax division. He was plant manager, lost wax division, Arwood Precision Casting Corp.

Ben A. Swennes was named director of engineering for products manufactured by **Ingersoll Kalamazoo Division**, Borg - Warner Corp., Kalamazoo, Mich. He has been with Borg-Warner for 25 years, serving since 1950 as director of engineering in charge of design and development of amphibious tanks. In addition, he now directs engineering for guided missile boosters and the recently acquired load lugger material handling equipment.

Blaz Lucas Jr. was made director of procurement for the Chicago works of **Ingersoll Products Division**, Borg - Warner Corp. He was general purchasing agent-raw materials at Studebaker-Packard Corp.

Earl R. Lewis Jr. was named production manager, cutting tool and gage divisions, **Pratt & Whitney Co. Inc.**, West Hartford, Conn.

Dana H. Bailey was named director of new products and process development, **Harris Calorific Co.**, Cleveland.

Allegheny Ludlum Steel Corp., Pittsburgh, made **F. Price Norris Jr.** assistant to vice president-sales, on special assignments; **C. R. Mitchell Jr.**, director of sales, stainless and specialty steels; and **Richard D. Mercer**, assistant to Mr. Mitchell, sheet and strip sales.

Jack P. Anderson was named chief industrial engineer of **Lunkenheimer Co.**, Cincinnati. He was associated with O. A. Sutton Corp.

American Air Filter Co. Inc., Louisville, named **Robert W. Nelson**, vice president, to direct its new administrative central staff. **John Hellstrom**, vice president and sales director, will in addition direct the American Air Division (Louisville operating division). **James W. May**, effective Nov. 1, will be director of technical training. He is now technical director, air filter products department.

Bruce H. Atwater was appointed sales manager, **Pastushin Aviation Corp.**, Los Angeles.

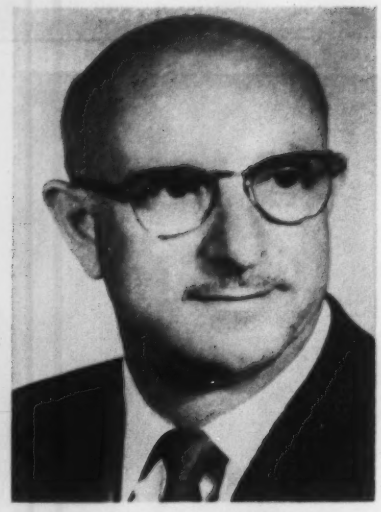
E. Forrest Kulp was made Cleveland district sales manager, **American MonoRail Co.** He is replaced by **V. Wellborn Cook** as manager, Charlotte, N. C., district office.

Donald L. LaVelle was appointed assistant pig and ingot product manager for **Kaiser Aluminum & Chemical Sales Inc.**, Chicago.

Richard Reiss and **Henry Levesque** were made assistant sales managers, **Baird Associates-Atomic Instrument Co.**, Cambridge, Mass.

J. Thomas Coggin was made manager of product engineering at the Elmira, N. Y., foundries of **Gen-**

CHARLES J. STOFKO
. . . gen. mgr. of Associated Spring divisions



NICHOLAS M. ESPOSITO
. . . Loud Machine Wks. production mgr.

MILLARD A. HAMMOND
. . . Babcock & Wilcox post

eral Electric Co. He continues in charge of the foundry laboratory.

Charles J. Stofko was appointed general manager, Barnes-Gibson-Raymond Divisions, **Associated Spring Corp.**, at Plymouth and Ann Arbor, Mich. He succeeds **N. Markham Purple**, resigned because of ill health. Mr. Stofko was factory manager for the Wallace Barnes Division at Bristol, Conn. His responsibilities there are assumed by **Stanley M. Rimmer**, as spring works manager; and **David L. McAllister**, as steel works manager.

Thomas C. Smith was named chief application engineer at **Leeds & Northrup Co.**, Philadelphia.

Dr. Edward L. Kozicky was made director of conservation for **Olin Mathieson Chemical Corp.**, Alton, Ill. **Mason M. Randle** was made quality control manager for the **Western Brass Mills Division** to succeed **Herbert A. Ball** who became special test superintendent at New Haven, Conn., for the newly created nuclear fuel division.

Chicago Steel Service Co., Chicago, named **Norman L. Pearson** manager, stainless pipe and tubing sales.

Robert T. Wilson was made general superintendent, Jefferson City, Tenn., zinc mine, **Tennessee Coal & Iron Division**, U. S. Steel Corp. He succeeds **Frank H. Brophy**, retired.

H. W. Loud Machine Works Inc., Pomona, Calif., named **Nicholas M. Esposito** to fill the new post of production manager. He was production manager, aircraft division, Axelson Mfg. Co., division of U. S. Industries Inc.

Walter W. Landgraf was made production scheduling manager, **Laclede-Christy Co. Division**, H. K. Porter Company Inc., St. Louis. **Robert N. Smaistria** was made Houston district sales manager for the division.

W. B. Haines fills the new post of director of field operations at **Toledo Scale Co.**, Toledo, O.

C. Brooks Ricca was made Philadelphia district sales manager for metal processing products, chemical department, **Pennsylvania Salt Mfg. Co.**

Joseph F. Ramey succeeds **John H. Hargreaves**, retired, as Boston branch automotive and industrial trades sales manager, coated abrasives division, **Minnesota Mining & Mfg. Co.**

John R. Church was named aviation sales co-ordinator for **AC Spark Plug Division**, General Motors Corp., Flint, Mich.

Fischer & Porter Co. appointed **Harold L. Russell** eastern regional manager, with headquarters in Hatboro, Pa.; and **William C. Abbey**, southwest regional manager, with headquarters in Houston.

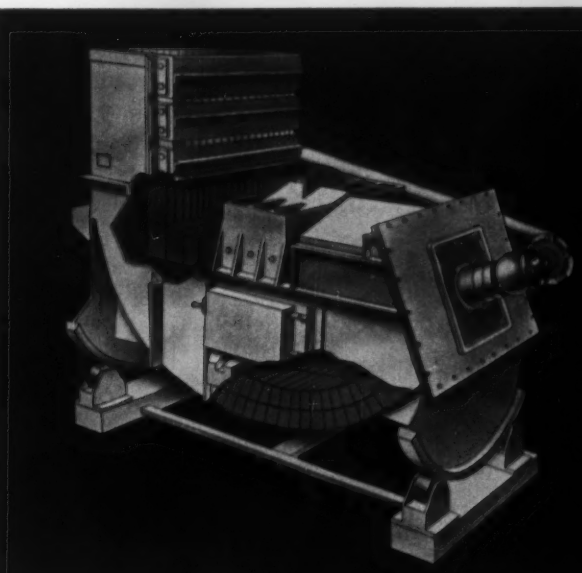
Millard A. Hammond was named manager of welding fittings sales, tubular products division, **Babcock & Wilcox Co.**, with headquarters at the Milwaukee plant. He was in charge of fittings sales in the division's Philadelphia district.

At the Midland, Pa., Works of **Crucible Steel Co. of America, Charles Yutmeyer** fills a new post (superintendent, steel works division) which combines open hearth and electric furnace melting units, bloom and billet mills and conditioning departments. **J. L. Edwards** fills a new post (superintendent, bar mill division) which includes the three hot rolling bar mills. **D. H. E. Genter** succeeds **J. E. Holt** as superintendent of the forge blank department and continues as superintendent, agricultural department. Mr. Holt is now superintendent, 24-in. bar mill department. **A. C. Redding** succeeds **W. I. McInerney**, retired, as superintendent, cold drawing and cold finishing departments.

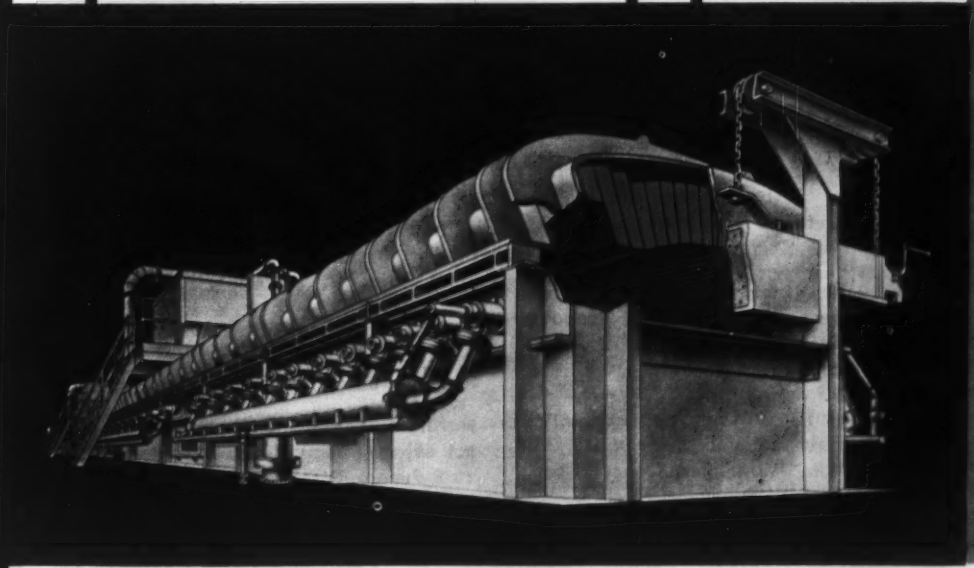
Lyman L. Clark was made sales manager at the Sunnyvale, Calif., plant of **Westinghouse Electric Corp.** He is replaced as transformer sales manager by **Harry H. Humphry**. Mr. Clark assumes his new duties Dec. 1, succeeding **Thomas R. Lawson**, who was made manager, control department, Buffalo.

John D. Burlie was made manager of the Tonawanda, N. Y., plant of **Western Electric Co.** He succeeds

Why B&W Allmul Firebrick withstand punishing service in furnaces like these



Direct-fired reverberatory furnace for melting brass, aluminum, and iron. For longer refractory life, B&W Allmul Firebrick are used to line the bath and arch.



In this type of furnace for continuous high speed heating of strip for welding into pipe, temperatures in excess of 3000 F are common and the atmosphere is contaminated with iron oxide. Because of their resistance to spalling and metal penetration, B&W Allmul Firebrick have set new standards for refractory life in bungs, burner blocks and recuperators.

B&W Allmul Firebrick stand up under extremely high temperatures at continued high rates of operation because they are produced from electrically melted mullite grain by a highly efficient process. These top-quality brick have high hot-load strength, high resistance to spalling, good volume stability and a melting point of 3335 F.

They are practical from a cost standpoint for a wide range of applications in the ferrous and non-ferrous metal industries. Illustrated on this page are a butt-weld furnace as well as a direct-fired reverberatory furnace. Other services are direct and indirect-arc electric furnaces, air furnaces, furnace hearths subject to iron oxide scale attack, crucible melting units and furnaces melting many non-ferrous metals and alloys.

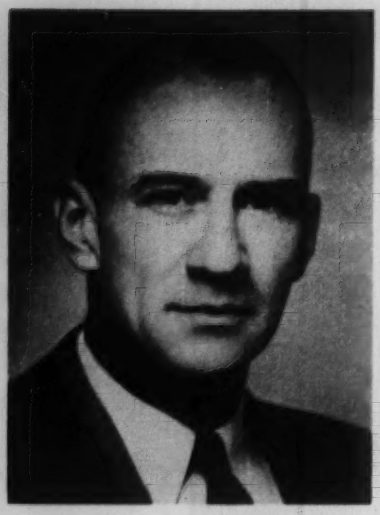
Your B&W representative can show you how B&W Allmul can lower your refractory costs in many heavy-duty services. Consult him or write for Bulletin R-34A, giving data on B&W Firebrick for exacting services.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

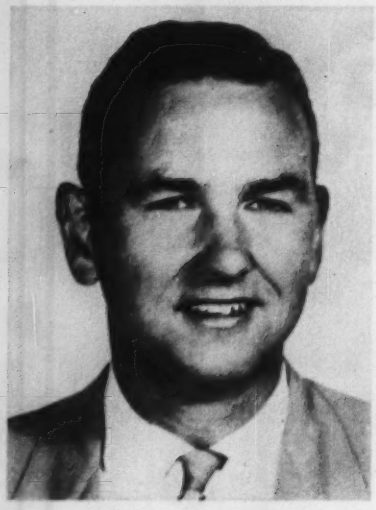
BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R 957



E. N. HOWER
. . . Dravo department manager



ELMORE H. BROADHURST
. . . gen. mgr. at Cyclops Div.

JOHN A. LINDBERG
. . . Mackintosh-Hemphill mfg.-manager

W. J. Ramsey who transferred to New York headquarters.

E. N. Hower was made manager, engineering and construction department sales, **Dravo Corp.**, Pittsburgh. He formerly was manager of the machinery division's industrial department.

Michael Montalbano was made director of computer research at **Kaiser Steel Corp.**, Oakland, Calif.

J. D. Kennedy was made Atlanta district manager, transportation products sales department, **Stran-Steel Corp.**, Ecorse, Mich., unit of National Steel Corp. **Philip R. Lochner** was made New York district manager and **J. K. Sparrow**, Philadelphia district manager.

J. Paul Reynolds was appointed to the headquarters sales staff of **Vacuum Processing Equipment Division**, F. J. Stokes Corp., Philadelphia, as a product specialist in charge of vacuum furnace sales and product development.

Elmore H. Broadhurst was named general manager, Cyclops Division, **Universal - Cyclops Steel Corp.**, Bridgeville, Pa. He was works manager of the Titusville, Pa., plant.

Richard C. Frensz was made industrial purchasing agent for **Miller Compressing Co.**, Milwaukee.

Henry A. Lundy was elected vice president of **Hardinge Bros. Inc.**, Elmira, N. Y.

Duane R. Elmore was made chief engineer, **Inland Steel Products Co.**, Milwaukee. He joined Inland as chief process engineer in 1955.

John F. Zubrod was appointed product manager, air conditioning division, **Whirlpool-Seeger Corp.**, St. Joseph, Mich.

S. L. Jackson was made New York district manager, **Electro Metallurgical Co.**, a division of Union Carbide & Carbon Corp.

John A. Lindberg was named manager of manufacturing, **Mackintosh - Hemphill Division**, E. W. Bliss Co., with plants in Pittsburgh and Midland, Pa. He replaces **Judson Neff**, resigned to become an industrial consultant. **Thomas H. Pattison** was appointed manager of the Pittsburgh plant to succeed **Charles V. Wilt**, who now serves as consultant.

R. E. Sprow was made manager of automotive sales and **D. G. Reed**, products manager at **Aro Equipment Corp.**, Bryan, O.

Robert L. Baldwin was named sales metallurgist by **Precision Steel Corp.**, Bridgeport, Conn.

Harold E. Martin was made product sales manager for metal parts at **Sylvania Electric Products Inc.** He has headquarters in York, Pa.

Sol W. Voorhes was appointed director of commercial sales for **Weber Aircraft Corp.**, Burbank, Calif.

OBITUARIES . . .

Joseph M. Schaeffer, 71, president, **Waterbury Farrel Foundry & Machine Co.**, Waterbury, Conn., died Sept. 7.

Harry O. Burrows, 64, former ingot plant manager of **Aluminum Co. of America** at Cleveland, died Sept. 10. For the last two years he has served as a consultant.

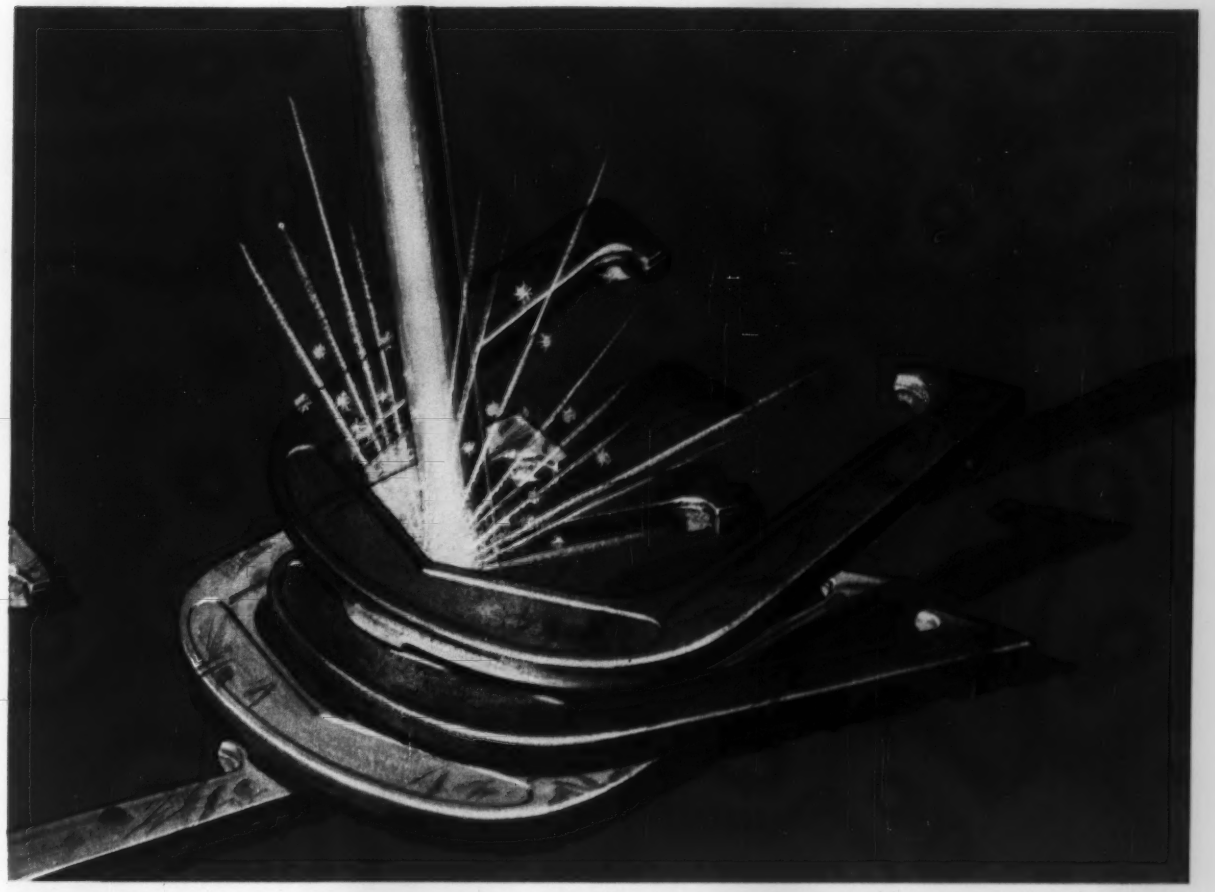
Frank W. Denning, 65, retired president, **Denning Tool & Die Co.**, Cleveland, died Sept. 13.

Ben D. Christian, 66, chairman, **Safway Steel Products Co.**, Milwaukee, died Sept. 11.

Spencer A. Pease, 68, head of the material procurement division, **Briggs & Stratton Corp.**, Milwaukee, died Sept. 10.

Cecil E. Brigham, 59, vice president, **Richardson-Allen Corp.**, New York, died Sept. 5.

Anthony W. Taylor, 56, director of purchases, **Crucible Steel Co. of America**, Pittsburgh, died Sept. 15.



"Finish first in your league"
...with J&L COLD FINISHED JALCASE STEELS

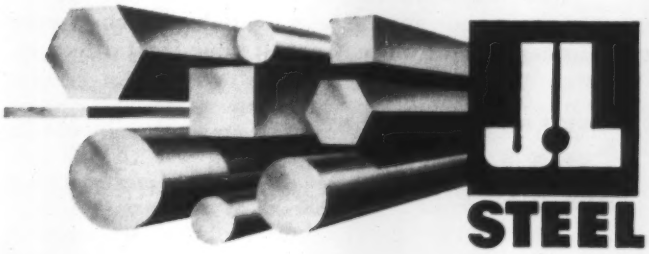
Cold Finished Jalcase—now available in 10 SAE and AISI grades—is the original free-cutting open hearth steel having the mechanical properties required for special service machined parts. And it's especially suitable for heat treating. This grade is one of a complete line of premium quality, free-machining bar steels developed over the years by J&L specialists. Thus, we can recommend the right type to help solve your particular problems.

Fundamental advantages of Jalcase are:

- **Easy, consistent machinability**
- **Minimum distortion**
- **Fast, uniform response to heat treatment**
- **High wear resistance**
- **Improved cold-drawn mechanical properties**

Adequate stocks are available in important industrial centers. Phone the nearest J&L District Office or your Distributor today for prompt and efficient service.

Pick the Free-Machining Steel that serves you best—from J&L's complete Cold Finished Line



Jones & Laughlin
STEEL CORPORATION · PITTSBURGH

COLD FINISHING PLANTS AT PITTSBURGH, PA., AND HAMMOND, IND.

Mr. J. R. Weidenheimer (center), Plant Superintendent of the Lynch Corporation, and Mr. L. C. Williams (right), Gulf Sales Engineer, check the performance of Gulfcut 21 on an Acme Turret Lathe where a cam is being machined. Steel used is NE8445.

. . . GULFCUT 21 was chosen

by the Lynch Corporation, Anderson, Indiana

"We did not choose Gulfcut 21 at random," says Mr. J. R. Weidenheimer, Plant Superintendent of the Lynch Corporation, well-known glass machinery manufacturer. "Many different cutting oils were tried but Gulfcut 21 proved best in our tests. We feel that it gives better protection to the tool and contributes to a smoother machining operation."

Scores of machine shops have discovered, as the Lynch Corporation did, that Gulfcut 21 is the answer when the job calls for a sulfurized mineral type cutting oil.

One important reason for the outstanding performance of Gulfcut 21 is a special Gulf process of combining sulfur. This provides greater sulfur activity over the entire range of a cutting operation—gives the tool maximum protection and helps to reduce built-up edge. Gulfcut 21 also has excellent anti-weld characteristics and extreme load carrying ability.

Gulfcut 21 is only one of the complete line of quality GULFCUT oils that will help you get improved production and longer tool life in all your machining operations.

Call in a Gulf Sales Engineer and have him recommend the most suitable type for each specific job in your shop. He is available through your nearest Gulf office. Consult your local directory.

GULF

GULF OIL CORPORATION • GULF REFINING COMPANY
1822 Gulf Building, Pittsburgh 30, Pa.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

Welded graphite—atomic age material—developed as . . .

Union Carbide Dedicates Lab

UNION Carbide & Carbon Corp.'s new research laboratories at Parma, O., managed by its National Carbon division, were dedicated last week. They have been in operation for several months (STEEL, July 30, p. 88).

Work covers four major fields of interest: Solid state physics (and closely related chemical physics), electrochemistry, carbon and graphite research, and the development of high-temperature processes and refractory compounds.

Dr. J. A. Krumhansl, assistant director of the laboratories, said: "Whether applied or basic (research), we believe that we shall make significant contributions to all the scientific areas represented, and also to new products, materials and processes."

New Materials—"In materials," he added, "we look forward to a future in high temperature refractory materials such as titanium diboride and cerium monosulphide, to new high purity elemental and compound semiconductor materials, to new forms of carbon and graphite, new materials for electronic cooling and a host of other still nonexistent materials.

"In processes, we hope to contribute new carbon processing methods, new physical environments in which to carry out chemical reactions, new catalysts for improving the speed and efficiency of chemical reactions, new electrochemical methods for electroplating or electrowinning and methods for usefully modifying solids or chemicals by using radiation."

New Products — "Finally," he concluded, "we will add to the Union Carbide product line. We can certainly see radically new types of batteries and carbon devices in sight, as well as various forms of energy converters, new components for electronic and computing systems, and we feel sure that we will make our quota of contributions in the electronic and nucleonic fields."

Researchers at the multimillion dollar facility have made notable advancements in their fields and are working toward other goals. For instance, a new technique for processing materials for the atomic age was developed here recently when scientists discovered how to "weld" pieces of graphite. The line between the shiny and dull regions in the piece of graphite (at left) is the place where two pieces were welded. The process is still a laboratory curiosity, but it suggests the possibility of new and radical fabricating techniques with wide applications.

A new "particle" theory has been advanced by scientists at the laboratories to explain where the bright light comes from in the carbon arc used in motion picture projection.

A new basic research program of the mechanism of catalysis is under way. Jet-age flight problems are being studied. A battery that produces electricity from such gases as hydrogen and oxygen is one of the many new devices under study.

Radioactive elements, sent from Oak Ridge in hermetically sealed containers, will be used increasingly in research at the Parma laboratories.

Pacific Scientific Builds

Pacific Scientific Co., Los Angeles, has completed construction of a 31,000-sq-ft furnace plant and regional headquarters at 6280 Chalet Drive, that city.

May Develop Iron Ore Property

Properties of Oceanic Iron Ore of Canada Ltd., near Ungava Bay in northern Quebec, Canada, are being investigated intensely by teams of consultants and specialists. Their aim is to help the company's management (Rio Tinto Mining Co. of Canada and the Oceanic board of directors) to de-

(Please turn to page 96)

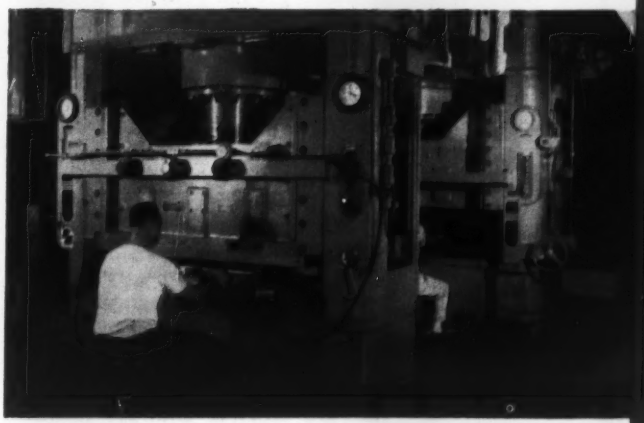
TO BE SURE IT'S H-P-M

Material flows through this press department smoothly and efficiently. Special frames on these short stroke H-P-Ms permit use of presses in areas with low ceiling limits. H-P-M fits the equipment to the job without sacrificing normal press efficiency.

AT Westinghouse

■ The effective utilization of important floor space in today's busy plants calls for maximum production per square foot. At the Westinghouse Electric Corporation in Mansfield, Ohio, waste motion and waste floor space are eliminated wherever possible. Seven H-P-Ms, from 200 to 600 ton capacities, are fitted into a compact press room facility. Metal forming operations are concentrated in minimum space for greatest economy of operation and material handling.

H-P-M All-Hydraulic presses are versatile . . . adapt easily to modern metal forming jobs. H-P-M's exclusive closed-circuit FASTRAVERSE system of press operation is infinitely adjustable, permitting the press to be easily and quickly regulated for each specific application. Accurate control of drawing speed, plus total elimination of high impact stresses, guarantees proper metal flow. Independent control of each hydraulic action provides just the right tonnage for each job. H-P-Ms have become basic press room equipment for hundreds of industries both here and abroad. There's a reason . . . may we send you complete information?



What could you do with six H-P-Ms in a compact area like this? Let H-P-M engineers plan your complete press facility—show you how to be SURE with money-making H-P-Ms.

HPM

THE HYDRAULIC PRESS MFG. CO.

Mount Gilead, Ohio, U.S.A.

A DIVISION OF KOEHRING COMPANY

(*Concluded from page 93*)

this iron field in production. If developed fully, the project would require a mine, processing plant, a town site, an airport, a seaport and a trans-shipment port.

Tubing Distributor Buys Plant

A. B. Murray Co. Inc., Elizabeth, N. J., tubing distributor, purchased the former Pacific Steel Boiler plant of National U. S. Radiator Corp. at Bristol, Pa. Murray will occupy a substantial part of the property for its new Delaware Valley warehouse and sales office.

Diamond Saw Erecting Plant

Diamond Saw Works Inc., Buffalo, is erecting a plant in Sardinia, N. Y. The firm makes metal cutting saws.

IBM Awards Building Contract

International Business Machines Corp., Kingston, N. Y., awarded a contract to Turner Construction Co. and G. D. Campbell Building Co. for the construction of a laboratory to house development engineering for its Kingston Military Products Division.

National Supply Opens Outlet

National Supply Co., Pittsburgh, manufacturer and distributor of oil field machinery and equipment, opened an oil field supply store at Borger, Tex. It is under the supervision of J. G. Lovett Jr., manager of the Wichita Falls, Tex., district.

Helical Tube Moves Operations

Helical Tube Corp. closed its Grand Rapids, Mich., operations and moved all its manufacturing facilities into a new plant at Newport, Tenn. Some new capital equipment has been installed.

Steel Distributor Expands

Bernard Epps & Co., Los Angeles, steel distributor, acquired a 55,000-sq-ft building to house its new Electroweld Tube Mfg. Division.

Industrial Gauges Opens Plant

Industrial Gauges Corp. completed a new plant in West Englewood, N. J. The firm makes devices which measure materials without touching them. Examples: They measure thickness and width of steel as it runs out of the rolling mills, sort tin plate into categories by thickness at the rate of several hundred a minute and inspect the walls of steel pipe for oil wells.

Lindquist Opens Warehouse

Lindquist Steels Inc., Bridgeport, Conn., opened a warehouse at 367 Reuter Ave., Elizabeth, N. J. The firm is a distributor of Bethlehem tool steels.

Karp, Lesser & Co. Formed

Daniel S. Karp and John Lesser, formerly chief executive officers of Karp Metal Products Co., Brooklyn, N. Y., organized Karp, Lesser & Co. Inc., serving as engineering and management consultants to the precision sheet metal fabrication field and allied industries. The new firm's offices are at 60 E. 42nd St., New York 17, N. Y.

Forms Canadian Subsidiary

Consolidated Diesel Electric Corp., Stamford, Conn., will begin manufacturing operations soon in Canada through a wholly owned subsidiary, Consolidated Diesel Electric Corp. of Canada Ltd. The Canadian firm will manufacture aircraft ground support equipment; hydraulic, pneumatic and electrical test equipment; diesel and gasoline generator sets for industrial and precise power applications.

Gilbert & Barker Expanding

Gilbert & Barker Mfg. Co. Ltd. is building a 14,000-sq-ft addition to its plant in Toronto, Ont. The firm makes gasoline pumps, other service station equipment and automotive heating equipment.

Howard Electric Changes Hands

A group of Dallas businessmen purchased Howard Electric Co., Chicago, a division of Howard Foundry Co., that city. The firm makes a standardized underfloor wire distribution system. Factory and operating offices will remain in Chicago; additional offices will be opened in Dallas. James W. Hudson has been named vice president and general manager. Other of-

Massey-Harris-Ferguson Launches New Product Line
In a significant move toward product diversification, Massey-Harris-Ferguson Inc., Racine, Wis., has introduced a full line of light and medium-duty utility tractors and attachments for industrial use. They will be merchandised by the firm's Industrial Division. The utility-boom attachment on this Work Bull model 303 moves machinery, castings, pipe and other hard-to-handle materials. Crane swings hydraulically to provide easy positioning without moving tractor. Mid-Western Industries Inc., Wichita, Kans., developed most of the attachments

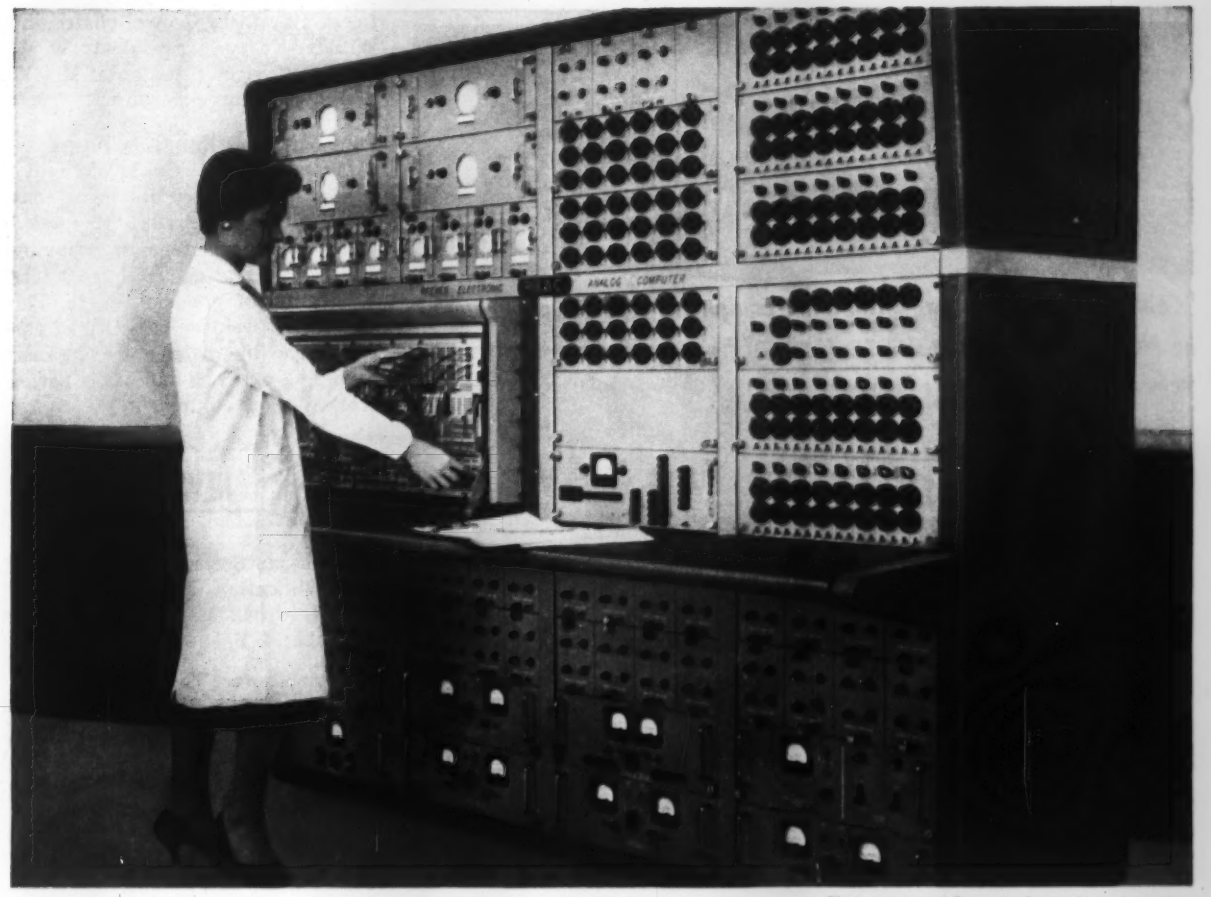


Photo courtesy of Dynamics Corporation of America

Electronic "brains" rely on COPPER!

Today, electronic computers pre-test the performance of guided missiles . . . forecast next year's sales . . . build safer bridges . . . and guide 5,000 freight cars a day through the mazes of 65 trunk lines in a single railroad yard.

You simply dial your instructions to these modern computers; they obey faster than thought.

But they need *copper* to operate.

Like nerves to the human head, copper wires transmit impulses to and from electronic "brains". Other vital computer parts are of copper, too.

Perhaps your product doesn't need to "think" . . . just *act*. Make it of copper and you make sure of performance no substitute can equal.

A typical "brain" puts copper and its alloys to many uses.	
Copper	Used in various forms, tempers, sizes for lead-ins to transistors, for lead-outs and wave-guide tubes. All wiring is copper, of course, 10 to 20 *miles* of it!
Beryllium copper Phosphor bronze	Beryllium copper is used because it provides excellent elastic and fatigue properties when heat-treated; phosphor bronze because of its exceptional spring qualities and resistance to wear. Both have properties which make them ideal for the 11,000 essential spring contacts. Torsion bars, clips, probes, and shafts also use these copper alloys.
Aluminum bronze Manganese bronze Naval brass	Used for gears, bearings, bushings, clamps, and structural parts.
Brass	Used for screw machine products, gears, hardware, fittings, springs, pins, and wherever soldering or brazing must be done.

COPPER & BRASS
RESEARCH ASSOCIATION

420 Lexington Avenue, New York 17, N.Y.

. . . AN INDUSTRY SOURCE OF TECHNOLOGICAL AID, INCLUDING A LIBRARY OF TECHNICAL LITERATURE AND A COUNCIL OF SPECIALISTS

COPPER OR ITS ALLOYS PROVIDE THESE ADVANTAGES:

Best conductor of electricity commercially available

Does not rust . . . high corrosion resistance

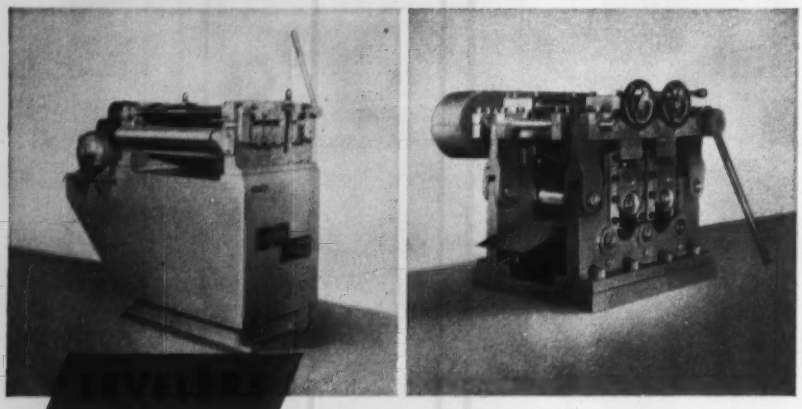
Best heat transfer agent of all commercial metals

Easy to machine, form, draw, stamp, polish, plate, etc.

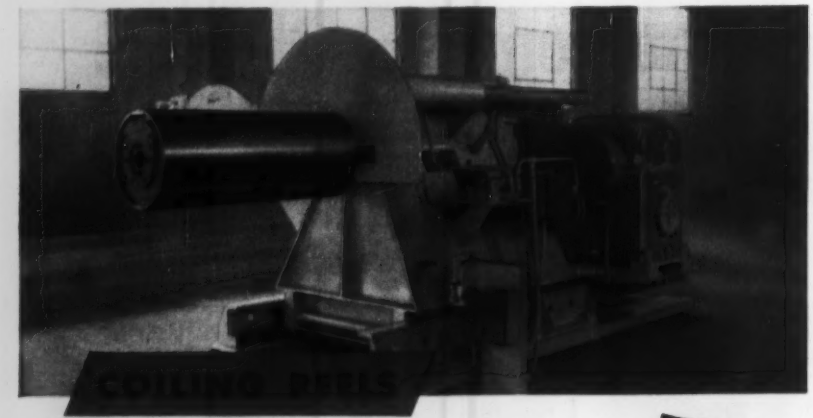
Welds readily . . . excellent for soldering and brazing

HERR EQUIPMENT

"Complete Processing and Handling Equipment . . . for any Ferrous or Non-Ferrous Material . . . That Starts — or Ends — as a Coil"



2-High and 4-High types. Driven and pull-through designs with quick release, for handling an extremely wide range of materials, widths and gauges. Rolls can be rubber covered if desired for easier adjustment and handling high finished materials.



Wide variety of types and sizes for coiling ferrous and non-ferrous strip. Fixed, adjustable or automatically aligning bases. Automatic oscillating level winding drive if desired. Link type contracting mandrels; manually or hydraulically operated. Furnished complete ready for use.

Write for fully descriptive Bulletin No. 561 today!

THE HERR EQUIPMENT CORPORATION

1250 VINE STREET • WARREN, OHIO

CLEVELAND, INDIANAPOLIS AND BERKELEY, CALIFORNIA

ficers are: L. B. Brown, chairman; William Kearney, president; W. C. Kearney, vice president; R. V. Lentz, secretary-treasurer.

Funk Aircraft Rebuilds Plant

Funk Aircraft Co., Coffeyville, Kans., has replaced its plant that was destroyed by fire. Expanded facilities include forming, shaving and heat treating equipment for production of precision gears. The plant increases the capacity of the company's line of gear reductions, reversing clutches and other power transmission equipment.

NEW ADDRESSES

American Society for Metals and its publication, *Metal Progress*, moved to 342 Madison Ave., New York 17, N. Y.

Thor Power Tool Co., Aurora, Ill., moved its factory sales and service branch in Detroit to 14515 Puritan Ave. The firm plans to open a branch in Indianapolis later this year.

CONSOLIDATIONS

Subject to approval by stockholders, **J. I. Case Co.**, Racine, Wis., and **American Tractor Corp.**, Churubusco (Ft. Wayne), Ind., will merge. This will give Case a broad entry into the construction and roadbuilding fields with a line of crawler tractors and earthmoving equipment.

U. S. Industries Inc., New York, has entered the field of engineering, design and manufacture of aircraft and missile components and systems through the acquisition of **Western Design & Mfg. Corp.**, Goleta, Calif.

Dresser Industries Inc., supplier of equipment and technical services for the oil, gas and chemical industries, acquired **Guiberson Corp.**, both of Dallas. Guiberson is a manufacturer of specialized oil well production and drilling equipment, such as tubing and casing swabs, molded rubber products, well serv-

What shape is a quality fastener?

Here is a handful of ELASTIC STOP® nuts. Each has ESNA's familiar red locking collar . . . is self-locking and vibration-proof. Each is a readily assembled, one-piece unit. Each provides positive protection against thread corrosion . . . prevents liquid seepage along bolts. Each is made from the finest of raw materials. Each is exactly controlled as to finished dimensions, class of thread fit and finish. Each is now in use on critical applications, with a record for uniform high quality that is unmatched.

Most of them are standard parts. Some originated as the result of a specific request for ESNA's help with an important fastening problem.

Isn't it logical to call on us with your next fastening problem?

ELASTIC STOP NUT CORPORATION OF AMERICA

ESNA

ROLLPIN TRADEMARK

Elastic Stop Nut Corporation of America
Dept. N62-960, 2330 Vauxhall Road, Union, N. J.
Please send the following free fastening information

☐ ELASTIC STOP nut bulletin

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

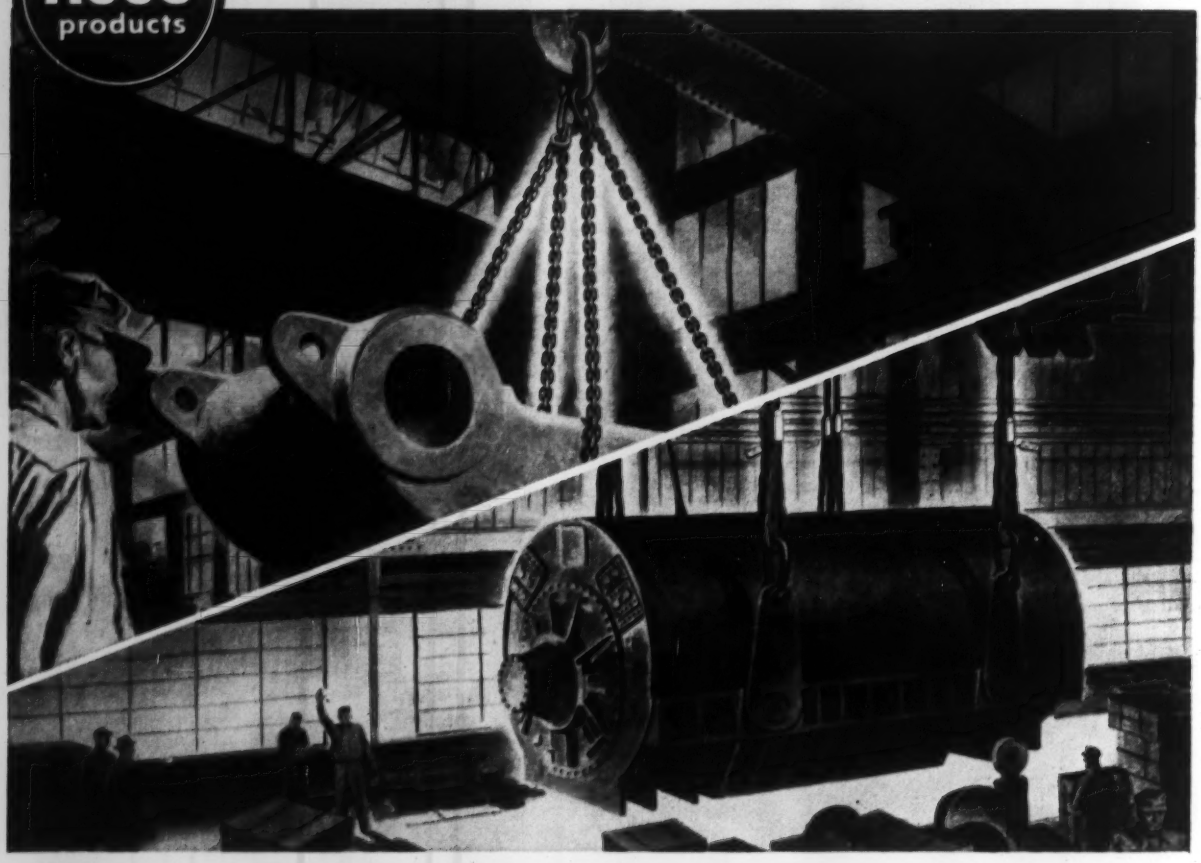
Street_____

City_____ Zone____ State____

ACCO products

Acco Registered* Slings–Wire Rope & Chain

THE STANDARD OF EFFICIENCY AND SAFETY



Why Acco *Registered* Slings are the Safest Slings Made

• Your job may demand Chain Slings, Wire Rope Slings—or a combination of both. Temperature, shape or weight of a load, protruding corners and many other factors tend to make one particular sling best for a particular application. But no matter what your requirements, ACCO has the right sling in its complete line of ACCO *Registered* Wire Rope & Chain Slings.

And with an ACCO *Registered* Sling you get the extra protection of the ACCO *Registered* program—extra safeguards which make ACCO *Registered* Slings the safest slings made.

Individually Proof-Tested • Each component of an ACCO *Registered* Sling is first tested to insure that it has strength at least equal to the sling body. All hooks for ACCO *Registered* Slings are Magnaflux tested. Then the slings are assembled according to carefully engineered designs which have proven their safety and effectiveness in extensive laboratory tests and field applications. The completed slings are then individually proof-tested at a load at least twice that for which the sling is rated.

Only after a sling has passed these rigorous tests is it registered. And this ACCO Registration is attested by a certificate and a ring or tag which are attached to the sling and accompany it to the user as his warranty of superior quality and safety.

New, Safer Master Link • Over the years ACCO has maintained a continuing research program to build more and more safety and quality into ACCO *Registered* Slings. The latest result of this research is a new and better master link for both chain and wire rope slings.

ACCO's engineers found that by shaping the master link in a particular fashion they could make it stand up under loads up to 18% greater than could standard round sections. You now get this new, stronger master link on all ACCO *Registered* Slings at no increase in price—together with the many other improvements developed by ACCO research over the years.

At Your Distributor • ACCO *Registered* Slings—Chain, Wire Rope or combination—are readily available from a distributor near you. Call him today for an extra bonus of safety in your lifting operations. If you don't know his name, write to our Bridgeport office.

*Trade Mark Registered

ACCO

AMERICAN CHAIN & CABLE

BRIDGEPORT, CONN.

Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Wilkes-Barre, Pa., York, Pa.
In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Better Value

icing equipment, drilling heads, gas lift valves and related products.

Birmingham Slag Co., Birmingham, and **Vulcan Detinning Co.**, Sewaren, N. J., will merge, subject to approval by stockholders. The new firm would acquire, through a stock exchange, **Stockbridge Stone Co.** and **Southern Cen-Vi-Ro Pipe Corp.**

ASSOCIATIONS

American Die Casting Institute, New York, re-elected these officers: President, W. J. During, Precision Castings Co., a division of Harsco Corp., Syracuse, N. Y.; secretary, David Laine; and treasurer, W. J. Parker. C. J. Sheehan, Die Casting Division, Aluminum Co. of America, Garwood, N. J., was elected vice president. Richard E. Kellers has been appointed to the national headquarters staff.

David R. B. Robson, president, Keystone Compressor Co., Philadelphia, was elected president of **Air Compressor Research Council**, Chicago. He succeeds H. M. Kidd, vice president and sales manager, DeVilbiss Co., Toledo, O.

REPRESENTATIVES

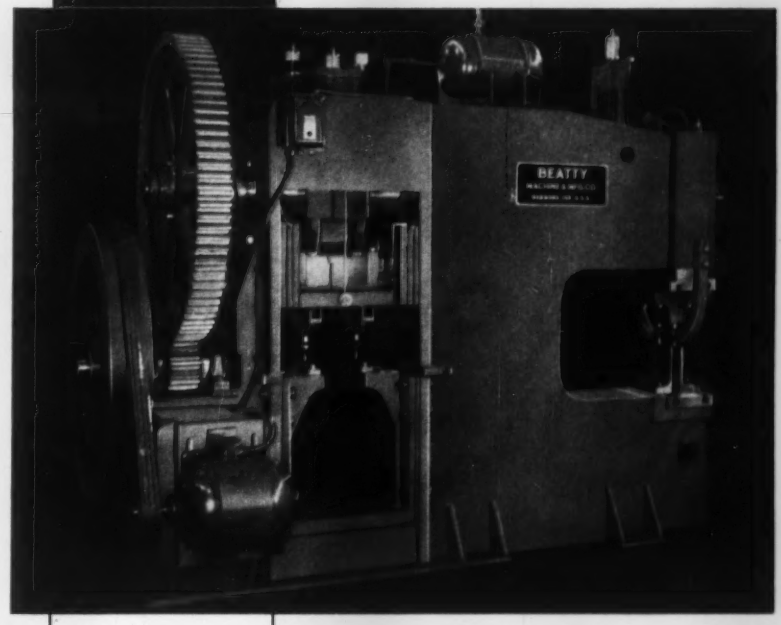
Shell Process Inc., West Springfield, Mass., manufacturer of shell molding and allied equipment, appointed Edwin A. Swensson Co. representative for western Ontario, Canada, in addition to the lower Michigan territory it now covers.

Uddeholm Co. of America Inc., New York, appointed Frank T. Campagna its Philadelphia district sales representative for its Swedish tool and special strip steels.

Cady Metal Fabricating Co., North Tonawanda, N. Y., manufacturer of pallet lifters for use with overhead cranes and hoists, appointed these distributors: Beals, McCarthy & Rogers, Buffalo; Albert H. Cayne Equipment Co., New York; John C. Mayfield Co., Houston, with branches in Dallas and San Antonio, Tex.

BEATTY
NO. 7 DETAIL BEAM PUNCH

New Detail Beam Punch Speeds Single-Hole Punching



Web Punch End One set single gag punch tools

Flange Punch End Two sets of single gag punch tools

In just three passes, instead of the usual five, this Beatty Detail Beam Punch punches flanges on either side of the webs of beams, as well as webs of beams, angles, channels and plates — eliminates the end-for-end turning of beams.

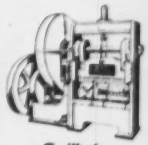
Incorporating an entirely new design that speeds single-hole punching, this compact new punch saves floor space and reduces your equipment investment by handling the work of three ordinary machines. Mechanically driven, it is of 100-ton capacity, open-throat and guillotine type, and will punch up to a 1¼" hole through 1" mild steel.

Write For Full Details

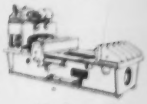
BEATTY
MACHINE & MFG. CO.

966 150th St.,
HAMMOND, IND.

Guillotine Beam (Flange) Punch



Guillotine Bar Shear

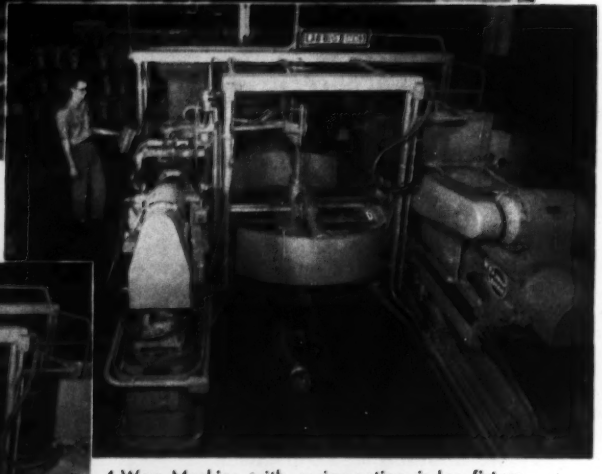


Horizontal Hydraulic Bulldozer

HOW W. F. & JOHN BARNES

"Specials" Cut Costs on

Overall view of three 5-Way Machines. First machine in foreground, bores and faces 5 flange holes; second, performs 8 combination drilling and chamfering operations; third, handles 14 tapping operations. All three machines are equipped with power transfer from gravity conveyor. One operator loads and unloads three machines at pushbutton stations.



4-Way Machine with reciprocating index fixture. Left-hand two-spindle heads drill and finish-ream .750" dowel holes in both ends. Right-hand single stub-spindle heads bore, chamfer and face stator and cylinder ends.

View showing workpieces in center turntable after 180° turn, ready for traversing into new machining position. Machining cycle at station 2 allows operator time for unloading and loading at station 1 without losing production time.

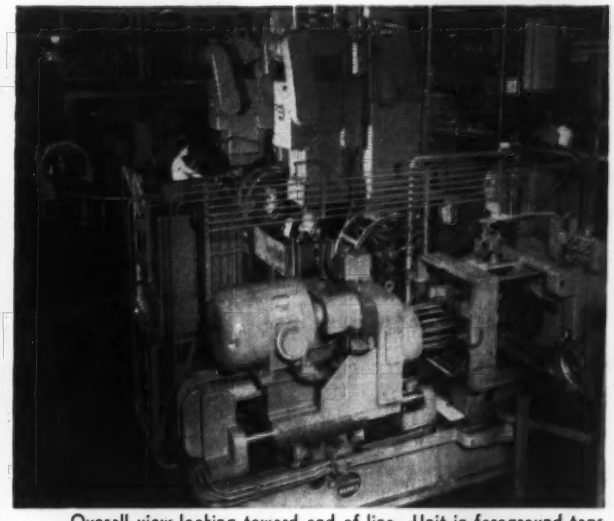
W. F. & JOHN BARNES

BUILDERS OF BETTER MACHINES SINCE 1872

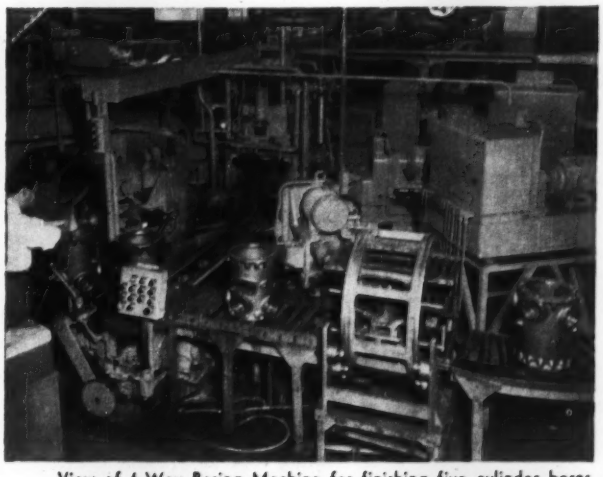
Special Machine Tools

Special Conveyor Units

Low Production Work



Overall view looking toward end of line. Unit in foreground taps 31 holes in ends of piece and presses in two center bushings. Vertical machines are facing units for machining stator end and hub, and cylinder end and hub.



View of 6-Way Boring Machine for finishing five cylinder bores and two babbited bushings. Concentricity of stator and crankshaft bores is held to max. of .005" T.I.R. Babbit chips are collected in separate chip box. C.I. chips for entire line are flushed automatically to a central system.

MULTI-STATION UNITS REDUCE MACHINING TIME ON COMPRESSOR CRANKCASES 1.85 HRS. PER PIECE

At Airtemp Division, Chrysler Corporation, Dayton, Ohio, a battery of ten Barnes Multiple Spindle Machines are today demonstrating the efficiency and economy of special machines engineered to serve relatively low production requirements. Previously, the compressor crankcases used in Airtemp's fine line of large 5-cylinder commercial air conditioning units were drilled, milled, bored, faced, and tapped in single operation machines. Now, most of these operations are performed automatically in Barnes specials. As a result, machining and handling time has been reduced 1.85 Hrs. per case. In addition, close tolerances are more easily maintained which has increased product quality.

PRODUCTION GEARED TO 15 CRANKCASES PER HOUR

The Barnes Multiple-Spindle Specials are incorporated into a semi-automatic production line which is geared to produce 15 crankcases per hour. Parts are moved between machines on gravity conveyors, and operators manually position workpieces into the loading station of each machine. Powered turnover and transfer devices are included to minimize manual effort. After more than 12 months of operation, the new line has effected savings equalling the preliminary estimates of Airtemp Engineers, and at the same time has provided the additional capacity to meet an increased demand for their product with little increase in floor space.

INVESTIGATE BARNES SIX-POINT COORDINATED MACHINE BUILDING SERVICE

We suggest you investigate the profit possibility of applying Barnes special machines to your work. Find out, too, how Barnes six-point coordinated engineering and building services can help you eliminate divided responsibility and save time. Write for free brochure or ask for an analysis on any specific job.

W. F. & JOHN BARNES COMPANY

434 SOUTH WATER STREET · ROCKFORD, ILLINOIS

Special Process Equipment | Special Electrical Controls | Food Machinery

NILSON 4-SLIDE TAKES A TOUGH ONE . . .

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.

THIS ONE WAS EASY . . .

A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons.

A. H. Nilson provides forming recommendations from detailed information without obligation. Send for catalog.

A.H. NILSON MACHINE COMPANY

1512 RAILROAD AVENUE, BRIDGEPORT 5, CONNECTICUT

Automatic Chain Making Machines : Staple Forming Machines : Wire Stock Reels

Wire Straightening Equipment : Slide Feeds for Presses : Wire & Ribbon Stock Forming Machines

8

STEEL's 1956 Management Series . . .

STEEL's editors herewith present the eighth in their ten-part series, Program for Management for 1956. The complete list:

1. **It's Time to Grow**
   (Feb. 13, p. 81)
2. **Know Your Costs**
   (Mar. 19, p. 83)
3. **Ideas for Industry**
   (Apr. 23, p. 105)
4. **Metalworking Goes to Market**
   (May 14, p. 107)
5. **Metalworking's New Horizons**
   (June 18, p. 137)
6. **How to Live with SUB (Supplemental Unemployment Benefits)**
   (July 16, p. 121)
7. **To Merge or Not To Merge**
   (Aug. 13, p. 89)
8. **Motivating Men To Produce**
   (Sept. 24, p. 105)
9. **Automation—Bogeyman or Bonanza?**
   (Oct. 15)
10. **Industry and College—Partners in Development**
    (Nov. 12)

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

Motivating Men To Produce More

TO MOTIVATE, says Webster, is to stimulate an active interest in . . . to provide with a motive . . . to move . . . to impel.

"In industry," says R. S. Livingstone, vice president of human relations for Thompson Products Inc., Cleveland, "motivation is our approach to employee relations, to get them to give freely and fully of their mental and physical energies to our activities."

People must be motivated to work. Forces outside your company gates provide a certain degree of motivation: Man's concern for the welfare of his family, his inherent desire to be doing something, the social stigma attached to idleness, etc. But that's not enough!

Employees *can be motivated* to produce more. With the proper approach to employee motivation, you can expect: 1. Increased individual productivity. 2. Greater employee attention to quality. 3. More individual emphasis on cost reduction. 4. Greater identification by the employee of his interest with the success of your company.

With direct labor costs mounting annually, alert managements are taking a more critical look at employee motivation techniques as well as improved equipment and processes to boost productivity. Areas getting closer scrutiny:

1. Supervision: Most metalworkers agree that the immediate supervisor or foreman plays a key role in whether the employee is doing his best or only enough to get by.

2. Communications: New approaches are being explored in an effort to develop the individual's feeling of personal responsibility for his job.

3. Integration of the employee's interest with the company's interest: Lip service to "your success depends upon the success of the company" is intangible. Needed are more programs in which the

Lincoln Electric's J. F. Lincoln says . . .

Real Incentives Boost Productivity

At Ohio State University, James Finney Lincoln was a four-letter football player. In his senior year, he was captain of a team that didn't have its goal line crossed all season.

Now 73 and chairman of Lincoln Electric Co., Cleveland, Mr. Lincoln has maintained the lessons learned in amateur athletics as a way of life . . . "it's that kind of competition that has made this country great." By applying those principles to his business activities, he built a production team whose individual workers earned an average of $8000 last year. Competition is a byword at Lincoln Electric.

Employees compete with job standards on piece rate work to earn higher wages. They compete with each other for higher merit rating status which nets them a bigger slice of the company's year-end bonus. As a group, they compete with other companies for more sales and higher profits. "But don't confuse our activities with a 'sweat shop' type of operation," he emphasizes. "Each employee is a member of our team, helping to win our game—a better product at lower cost."

"Real incentive—or motivation—is recognition of our abilities by our contemporaries and ourselves," says Mr. Lincoln.

In practice it means two things: First, management must recognize that all individuals have latent abilities that can be developed and then provide opportunities for that development. Second, management must show its recognition of the individual by rewarding him fairly for his contribution to the enterprise.

And these are the results, Mr. Lincoln points out: "Our productivity per man in terms of dollar sales is four times larger than the average of our industry. We average a 10 per cent reduction in direct labor costs annually. We haven't had a layoff in over 15 years."

Mr. Lincoln calls this emphasis on the individual and his personal development "incentive management." For his five suggestions for helping individuals to develop, see page 110.

individual is directly recognized and rewarded for outstanding contribution to company activities.

4. Morale: This is not a motivational factor per se. But human relations experts agree that effective motivation depends upon good morale.

5. Emphasis upon the individual: Human nature craves recognition, a chance to participate.

First Impressions

Don't look for a set of gimmicks to boost productivity. Motivation is an attitude. "It starts at the employment office," emphasizes George A. Jacoby, director of personnel relations for General Motors Corp. "The employee is sensitive to his experience at the employment office—its appearance, the people he contacts, the treatment he gets. He develops an attitude right there. Be sure it's a good one. From then on, motivation is influenced by all of our day-to-day relationships with that employee, and particularly by the relationships maintained with him by his foreman."

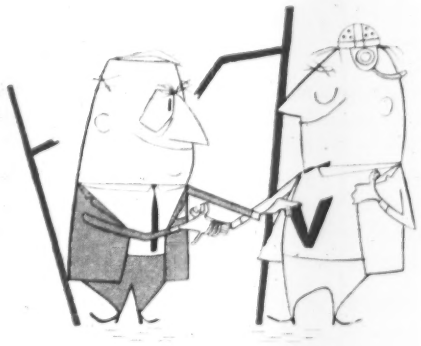
Money, of course, is one of the most important motivational factors in our society — at the lower levels it's synonymous with standard of living; at the upper level, it has social recognition for achievement and status. But money isn't the total picture. "Otherwise," one executive put it, "we'd have few employees. They'd all be answering the want ads for construction workers."

Emphasis upon money as a motivational factor varies. General Motors and Minneapolis-Honeywell Regulator Co., for example, have no piece rate incentive plans. Emphasis is on "a fair day's work for a fair day's pay."

Many companies feel that incentives above a base rate are important in motivating employees to boost productivity. Frank Armstrong, assistant director of industrial relations, Burroughs Corp., Detroit, believes incentives should be used where possible. "Approximately 35 per cent of our employees are on incentive plans, either individual or group," he relates, "and we're trying to include more people under incentives all the time."

One point to remember in establishing incentive rates: The basic job rate should reflect what the average worker can produce — a fair day's work for a fair day's pay. Incentives are recognition for above average, superior performance.

Another factor in pay rates worth your consideration is the pay differential between jobs. Industrial relations executives admit the employee is more con-



Motivation begins when you . . .

Satisfy These Employee Needs As Voiced by GM Workers

GOOD SUPERVISION—"the most important to me . . . I have a good foreman"

"He thinks I have more ability than I think I have, so I consistently do better work than I thought I could. He always shows pleasure when a job is well done. He is smiling, good natured, patient; always ready to concentrate all his attention on any problem with which I need help."

GOOD WORKING CONDITIONS—"everything possible to make my work safe"

"Everything I could conceivably need for my work is at hand . . . fine machines, tools, equipment, materials. I have plenty of light . . . air is kept clean . . . overhead hoists do the heavy work . . . a well-equipped hospital is nearby."

PRIDE IN WORK—"I'm like a doctor"

"When a machine is down because of the tools, I can make over the old tool or make a new one that will start it working again—'I have cured the patient.' When I must remove 0.0001-in. from the tool, it's like a delicate operation of a doctor—if the doctor fails, the patient dies; if I remove too much, the tool in a sense dies because it becomes useless."

FAIR PAY AND SECURITY—"Comfort and security for my family"

"I like my job because it provides me with much more than a mere livelihood. The company I work for is a leader in its field. Its bigness gives me a feeling of security. My company is interested in the comfort and welfare of its workers . . . has spared no expense or pains to look after every need."

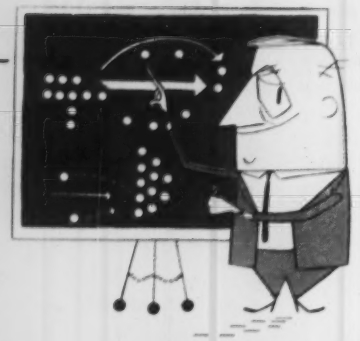
RECOGNITION, ADVANCEMENT—"an education with pay"

"I have never had to ask for a raise. They have come through steadily with my increasing abilities. I have never felt any discrimination because I am a girl. There's a policy here—if you're doing a man's job, you get a man's pay."

Following World War II, many companies felt the need to improve productivity. The pressures of making war materials, the long hours worked, were followed by a general let-down.

To improve this situation, General Motors started a contest to determine just what employees' attitudes were and to try to improve those attitudes by directing attention to the more positive things about their jobs. The contest offered 5000 prizes—40 of them automobiles—for writing essays on "My Job and Why I Like It." The accompanying quotes are from those essays.

GM felt that the contest helped improve attitudes and productivity. Some 175,000 entries were submitted. In the next two years, GM analyzed the letters, worked up a check list of 65 reasons for "liking the job" and issued each division a report on its standing for each item in comparison with the over-all corporation. Each division was then able to take action it felt advisable—based upon the attitudes of its own employees as expressed in the essays.



Motivation and the Supervisor's Role

1. **Foremen should stick to supervisory functions**
   Foremen with the highest productivity records devote more time to planning and special skill tasks. In employee attitude studies, this type foreman was generally perceived by his workers to have superior ability and be a better administrator than the foreman who "pitched in" on rank and file tasks frequently "to help out" on the line.

2. **Foremen should be "employee-centered"**
   High productivity foremen: A. Emphasize training employees to do present jobs well. B. Train employees for next job higher. C. Show interest in individual's problems both on and off the job. D. Are more understanding and less punitive when mistakes are made. This is in contrast to punitive foremen: "It's my job to keep employees turning out the work . . . you have to make examples of them sometimes . . . the production chart, not their personal problems, is my chief interest."

3. **Don't breathe down their necks!**
   Foremen who supervise too closely tend to have low productivity records. High productivity foremen give adequate instructions but generally let the employee have more freedom in working in his own way and make fewer checks on his work.

Source: Studies on Human Organization and Worker Motivation by University of Michigan's Institute for Social Research.

cerned about the spread between his pay rate and the job rate above it than he is about the difference between his rate and one outside the company. "It's only human to want to build up your own job," says Mr. Armstrong. "We feel that 2 and 3-cent differentials are too small; we're trying to eliminate them in favor of 10-cent differentials which we feel will be more effective as a motivational factor."

Coach—or Errand Boy

Don't underestimate the influence of your foreman and supervisors—the coaches of your production team—in motivation. Take your own company. Why does productivity differ among departments doing similar work, or, more particularly, among shifts in the same department? Odds are better than even that you'll find at least part of the problem is the difference among foremen.

The University of Michigan's Institute for Social Research has conducted extensive studies on the relationship of foremen to productivity. Highly productive foremen, it found (see above box), tend to view their jobs primarily in terms of human problems rather than in terms of rules, procedures and the mechanics of production goals.

Here's a note of caution regarding the relationship of high productivity and the building of team spirit by a foreman. The university looked at productivity and group cohesiveness and found this: Groups which were high producers were characterized by a high degree of cohesiveness. However, many low productivity groups also showed a high degree of cohesiveness. The point: A close-knit group of employees doesn't guarantee high productivity. The effectiveness of any team depends upon the foreman's or supervisor's influence in channeling that group effort into constructive directions.

That's why human relations courses as part of your foremen's training program should be a must. Bullard Co., Bridgeport, Conn., recommends the conference type program for this training.

Finally, don't expect maximum effectiveness from foremen and supervisors if their responsibilities and authority are superficial.

Hotpoint Co., Chicago, has a program with strong motivational factors that's worth your consideration. Part of each foreman's responsibilities each quarter is to set a personal goal for his department in such activities as quality control, scrap reduction, cost reduction and safety. To do this, he calls in his section leaders, who, in turn, rely on production people to help establish these goals—and then to achieve them. In this way, a sense of participation is developed not only between the fore-

man and his superiors but between the foreman and his subordinates.

No Place for Sergeants

Managements sold on the value of effective motivation are redesigning communication approaches to eliminate the "yours not to reason why" philosophy. Where possible, they use the individual approach rather than a broadside to all employees.

In your communications you should attempt: 1. To make every individual feel important and necessary. 2. To emphasize the importance of his job to your operations.

And every job is important. One industrial relations executive points out that his staff periodically makes it a point to contact the janitors and grounds keepers to stress the importance of their work.

AC Spark Plug Division of GM makes it a point to give individual recognition to as many employees as possible. When a foreman sees or learns of some achievement, he issues the employee a commendation certificate.

If yours is the complaint that "we can't reach the individual because of the union," take a look at Minneapolis-Honeywell's union-management co-operation program. Union and management officials at all levels—top company executives down through department heads—meet frequently to discuss business activities of the company and special problems. The result has been that the employees recognize the importance of standards, cost reduction, etc., in the company's competitive business world.

In one situation involving a department of about 100 men, a feeling had developed among the workers that their wage rate was not in proper relationship with those in other plants. With no success, management tried many ways to show the rate was proper, including rechecking standards and even taking cases to arbitration. Under the new union-management co-op plan, both company and union representatives took the story to the employees involved. Result: Production increased almost 14 per cent.

Keep Them Informed

More and more companies are recognizing the value of monthly meetings between foremen and employees to discuss company business activity as well as any other

Motivate Through Improved Communications

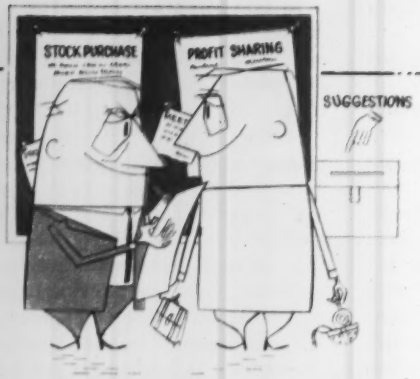
Jobs take on new perspective when the individual's work is related not only to the product he's making and its end use but also to the company's over-all competitive activities.

One of Minneapolis-Honeywell Regulator Co.'s most effective communication phases of its union-management co-operation activity is the Team Program. Under it, goals are set for the team and emphasis is on the conviction that everyone must participate to reach the goal.

The above "team" is a manufacturing department of the Aeronautical Division—its goal is scrap cost reduction. Represented in the meeting are the vice president of the union local, department steward, committeemen, setup men, foremen and assistant foremen.

Meeting topics include the division's products, their end use and competitors' activities—"each individual has a counterpart in each competitor's company against whom he competes."

Greater employee interest in his job and participation in the team goal are evoked through the challenge: "What can each of us do to reach the goal?"



These programs motivate employees because they...

Integrate Employee Interest with Company Interest

1. Suggestion Systems—

A. Set up a formal administration system so that all suggestions are processed promptly.

B. Size of awards should be commensurate with the value of the suggestion.

C. All suggestions, whether usable or not, should be acknowledged. Individuals whose suggestions are adopted should be given special recognition.

2. Profit Sharing Plans—

A. Be sure your program permits sufficient "profits" for the individual to stimulate his active support.

B. Promote the program continuously by tying in profits to safety, scrap reduction, suggestion programs, etc.

3. Stock Purchase Programs—

A. The preferable plan is one which offers employees an "option to buy" feature. When conducted over a specific period—three years, for example—the employee signs up at the beginning for payroll deduction. At end of period, he has the choice of buying stock if the market is favorable or taking savings, plus interest, if it is not.

B. The more successful plans permit employees to purchase stock below market value—usually 10 per cent.

problems the employees have. This doesn't mean shutting down a whole department for an hour or so each month. At Burroughs Corp., department employees elect three representatives to meet with the foreman, the superintendent and generally another member of management. If an employee has a specific problem, he gets the representative to bring it up at the meeting. Representatives then report back to the employees. Minutes of the meeting are posted on a bulletin board.

Lincoln Electric Co., Cleveland, provides one of the outstanding examples of industrial emphasis on the individual. Says Chairman James F. Lincoln (see page 106): "The personnel of any organization has inherent in it the making of a company of unique and outstanding ability if only the environment will stimulate in the employees a desire to develop their latent abilities."

Skeptics charge that Lincoln Electric's plan is a version of dangling the carrot on a stick in front of the employee. To this Mr. Lincoln challenges: "Take any amateur athletics from the high school to the Olympic level; the only carrot in front of these people working their hearts out individually and as a team is recognition and a chance to participate."

Employees at Lincoln Electric are merit rated twice a year on four factors: Supervision required, contribution to improvement, output, workmanship and attitude toward quality. The rating establishes an individual's standing within his own group or department. As the group average increases, each individual must increase proportionately or his individual status drops. If he progresses more rapidly than the average, his status goes up. This status is one of the factors determining his slice of year-end profits.

The net result, says Mr. Lincoln, is to accent the individual's responsibility for his job. This tends to reduce the amount of supervision and quality inspection required—high cost activities for any company.

Set Up the Ladder

How do you provide the atmosphere for an individual to develop? Mr. Lincoln suggests these five steps:

1. Occasionally, give the person you wish to develop a job that's over his head. If the pressure, incentive and crisis are honest and real, most men will rise to it.

2. Each individual must have the feeling of responsibility for the team of which he is a member. You—the leader—must be responsible for developing that team spirit.

3. Keep the pressure on. After the first step has been accomplished, have the next follow quickly. Don't let a man relax with the feeling that he has arrived—no

one ever does or can arrive. This is not slave driving; it gives a sense of accomplishment which is our greatest satisfaction.

4. Advance the man only on his ability and contribution to the company's success. Don't wait for funerals!

5. When the man makes the team, accept him as a teammate.

Some feel the Lincoln Electric plan is too extreme for their operations, but are integrating employee interest with company interest in other ways: Profit sharing, suggestion systems, stock purchase plans, bonuses, etc.

According to the Council of Profit Sharing Industries, Chicago, there are an estimated 32,000 pension and profit sharing programs in industry today — more than double what the figure was in 1950. About one out of three is a profit sharing plan.

Talk Profits

There are two general kinds of profit sharing. 1. Cash—this plan pays monthly, quarterly, semiannually or annually and has the advantage of immediacy in motivating employees. 2. The most popular is the deferred payment plan — retirement, severance or death. The advantages here, of course, are the savings, plus accruals from earnings and appreciation of fund investments.

Motorola Inc., Chicago, provides an impressive example of the potential of the deferred type plan. Its program, although only eight years old, has a fund totaling over $26.1 million. Employees contribute up to $200 annually (99 per cent put in the maximum) and share in the profit slice according to that contribution—seniority and salary are not factors. The employee who has contributed the maximum $200 since the plan was originated now has a $10,170 personal stake in the fund.

"With that kind of money involved," officials explain, "when we tie in scrap drives and cost reduction programs to profits, it means something to the individual."

You're missing two great opportunities if you don't have a formal suggestion system. Properly administered and promoted, suggestion systems: 1. Serve as excellent employee motivational factors. 2. Provide an unlimited source of money-saving ideas.

The motivational factor is demonstrated in the employee participation of such programs. Most executives say you can expect one out of three employees to turn in suggestions. At AC Spark Plug, over 7100 out of 13,800 employees turned in suggestions in 1955. Awards totaled $179,766.

"Historically," says Don Morse, head of the suggestion plan section of GM's central office, "better than 25 per cent of the suggestions we've received have been adopted."

Suggestion systems require continuous promotion to be effective. A good promotion idea is to set up exhibits which will demonstrate to employees the four best avenues to award-winning suggestions:

1. Modification of processes to reduce quantity or cost of material. 2. Substitution of material of lower cost. 3. Modification of design to reduce quantity or cost of material required. 4. Salvage of tools, use of waste or scrap material.

Where Morale Counts

How's your employee morale? High? That's good, but don't be lulled into thinking that you're getting high productivity because of it. It's not always true that happy workers are good producers.

Yet, good employee morale is the starting point for effective motivation. Few men can be inspired to maximum effort if their morale is low. Good working conditions, pleasant associates, convenient parking areas, adequate cafeteria and lunch facilities are important.

The most effective morale builders are those programs which are aimed at the individual—give him recognition, chance for participation, feeling of importance. It's in this area that extra activity programs pay off—company newspapers, recreation and social programs, worthwhile drives like Red Cross or blood bank appeals.

Many employees have leadership desires, plus certain abilities, but because of their educational background, experience or other circumstances, they are unable to achieve leadership roles in the company for which they work. Take a look at labor union leadership, particularly on the local levels, for the prime example of this.

Extra activity programs provide: 1. An outlet for tensions that often build up from day-to-day work routine. 2. Opportunities for exercising as well as developing leadership

A big factor in motivation is . . .

Morale: Extra Activity Programs Boost It

Employees at Burroughs Corp., Detroit, have a dues-free membership in a beautiful 580-acre private club, Burroughs Farms. Dedicated in 1927, the club offers employees and their guests swimming, golfing, baseball, tennis, archery and gunnery ranges, picnic areas, clubhouse and restaurant and dancing facilities. It also offers cottages for rent.

Employees pay small fees for such things as green fees for golf and boat rentals. It costs the company $15 per employee annually to maintain the club and assist with various programs.

A set of gimmicks won't fool employees . . .

Motivation Is an Attitude

Are you providing the atmosphere which encourages teamwork among employees to help you produce better products at lower costs? Answers to these questions will provide the clues.

1. Are our wage rates and benefits equal to or above the average in our area and industry?
2. Are we providing individual and group incentive rates where possible?
3. Are we providing working conditions and equipment which are conducive to making an individual do his best?
4. Are we taking advantage of as many opportunities as possible to give the individual personal recognition for achievement and outstanding performance?
5. Are we providing sufficient opportunities and assistance to insure progress of employees?
6. When decisions affecting an individual or group are made, do we provide an opportunity for the employees to participate in that decision whenever feasible?
7. Are we taking advantage of opportunities to more closely integrate the employee's interest with that of the company through such programs as profit sharing and suggestion plans?
8. Are we stressing the individual rather than group approach in our communications?
9. Are we in management exhibiting the same interest and aggressiveness in our duties that we expect from our employees?

abilities. 3. Methods for developing better understanding among employees through association in play as well as work. 4. Opportunities to give individual recognition. 5. An atmosphere for developing and strengthening team spirit.

Don't automatically label your extra activity programs failures if only 50 per cent of the employees participate—they may be the only ones who need them. The participation ratio may depend upon the individual's opportunities outside the company for such extra activities.

Perhaps the most important factor in extra activity programs is the administration. Employee programs should be company generated, but employee operated.

Reliance Electric & Engineering Co., Cleveland, and many other firms feel that the burden of financing such activities should fall on the employees, particularly in recreational and social programs. Management should, however, act in an advisory capacity when required and give financial support when circumstances dictate it to insure success and interest in the programs.

Look in the Mirror

A final motivational factor, and perhaps the most important of any mentioned so far, is for management to set the example. To motivate employees to peak performance of the standards you've set for them, you must establish and enforce high standards in your own functions.

Few activities will demoralize an employee more than having to stand around waiting for something to do because management has fumbled the ball—anything from poor production scheduling, which idles an individual for an hour, to loss of business to a competitor, which results in a layoff.

How would you rate if your employees were to compare your company with neighboring companies and with those in your industry on these points? Annual growth. New product development a n d product improvement. Wages and benefits. Growth opportunities for employees. Up-to-dateness of plant and facilities.

This era of increasing automation also has challenging implications concerning the development and motivation of the individual. It may be true that nobody will tend the machine in operation, that handling and feeding the machine materials will be automatic. But how well the machine performs will still be determined by the employee who sets it, maintains it and directs it. The average job will become more complex, and there'll be greater reliance upon the individual's initiative, co-operation and responsibility toward his job and company.

Lawrence A. Appley, president of American Management Association, in his new book, *Management in Action*, emphasizes: "Management is the development of people—not the direction of things."

Accept and put into practice that simple truth; it is the key to employee motivation.

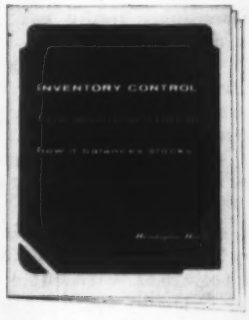
is it profitable?

Inventory represents about one-third of the capital invested in manufacturing and usually is the largest item on the balance sheet outside of plant and equipment.

Inventory difficulty exists in two opposing forms: one is oversupply, the other is shortage. OVERSTOCKS result in increased investment, useless tying up of capital, increased insurance, more floor space for storage purposes, deterioration and obsolescence, and other substantial losses. UNDERSTOCKS result in lost sales, extra expense of "rush" orders and last minute buying, and idle shop time waiting for material.

Profitable manufacturing inventories are obtained by balancing the costs of "getting" raw materials and finished goods against the costs of "keeping" them — the more inventory in the stockrooms the greater the cost.

Remington Rand's comprehensive, new illustrated booklet, "Inventory Control for Manufacturers," is filled with the most effective, modern techniques for balancing stocks and reducing costs.



write today for this free booklet

Don't miss this opportunity to get the full picture of what Inventory Control means to Management, Production, Purchasing and Sales. Upon inventory availability and adequacy depend scheduling, workflow and delivery — even such human factors as job stability and good labor relations. Inventory Control is the backbone of all manufacturing operations.

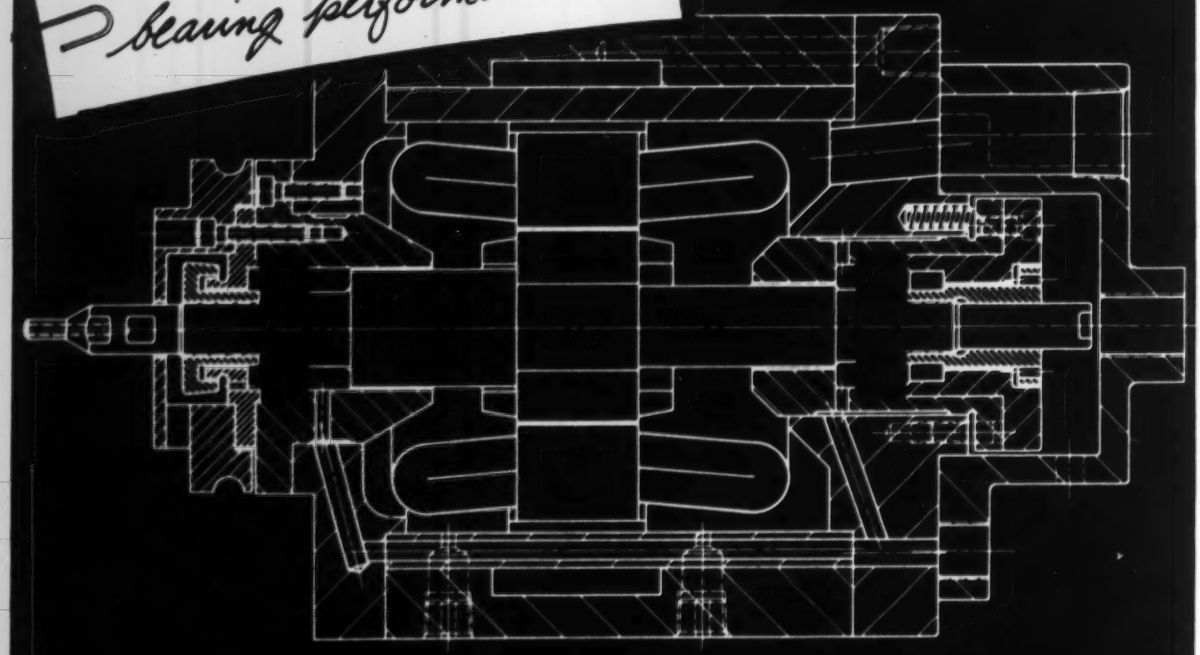
No two plants have the same problems but the principles of a good inventory control record as outlined in this booklet, may be profitably adapted and applied to the needs of any business.

Write today for this new booklet. Ask for KD406 "Inventory Control for Manufacturers... How It Balances Stocks and Reduces Costs." Remington Rand, Room 1968, 315 Fourth Avenue, New York 10.

Remington Rand

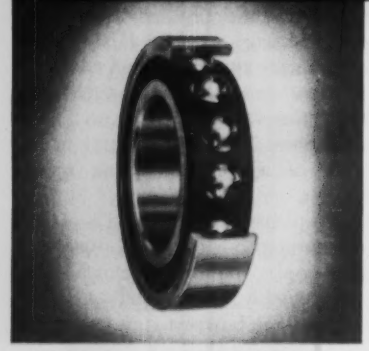
DIVISION OF SPERRY RAND CORPORATION

Looking for improved bearing performance?



over 14 billion revolutions...

— and still going strong



Fafnir Super-Precision MM201W1-CR spring-loaded ball bearing, the type specified for wheelhead illustrated.

Fafnir-equipped, high-speed, oscillating grinder wheelhead demonstrates machine tool progress in performance

This extraordinary record has been made on the production line by a Pope-built wheelhead, grinding the races of extra-precision ball bearings. The hi-frequency motorized wheelhead operates at 72,000 rpm. The motor is water-cooled and bearings lubricated by means of an oil-air mist system.

When designing this oscillating grinder wheelhead, Fafnir engineers worked together with the Pope Machinery Company engineers in the selection and application of bearings. The type of bearing recommended is shown at the left and its application in the drawing above. Its performance record, according to Pope, demonstrates progress to match today's improved machine tools.

Whatever your bearing problem, a few minutes spent with a Fafnir representative may be the means of solving it as successfully. Write The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR
BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

Technical Outlook

GREAT NEED— Better high temperature alloys have a top spot among problems being worked on at the new Westinghouse Research Laboratories (dedicated Sept. 20). Here are two examples: A molybdenum alloy containing about 0.5 per cent zirconium clad with Inconel shows promise of increasing efficiency of jet engines more than 15 per cent by raising operating temperature to the 1800°F range. Scientists are busy studying metals for use in a supercritical steam turbine under construction. It will operate at an input steam pressure of 5000 psi—double that of conventional turbines in electric utility service. Steam temperature is 1200°F—so high that parts containing it glow red. A new nickel-cobalt base alloy (Nivco) is being tested for use here.

CENTRIFUGAL CONVERTER— In the wind is a high-temperature reactor that will take hot pig at the blast furnace runner, spin it in a tube for maximum reaction surface, desulphurize it with caustic soda, desiliconize it with oxygen and deliver it ready for finishing in the open hearth or electric at a temperature hotter than it left the tap hole.

QUICK HEAT— Bochumer Verein A.G., Bochum, Germany, has a resistance heating process for small billets (for rods and bars) which brings them to 1800°F in 60 seconds. Scaling, cracking and surface decarburization are virtually prevented.

CORED FORGING— The Air Materiel Command plans to have aircraft fittings of No. 8 size and larger produced by cored forging. Production methods worked out with the Weatherhead Co., Cleveland (STEEL, July 2, p. 67) show that raw material can be reduced 40 per cent, manufacturing time 38 per cent. Aluminum fittings made by cored forging have a finer grain structure and twice the service life of those made by other methods, says AMC.

Each plane requires about 1500 hydraulic and other fittings, making a yearly total of 4.5 million. To that total, replacements, ground support equipment and missile requirements must be added. Altogether, the Air Materiel Command figures that savings through cored forgings can amount to more than $1 million a year.

X-RAY MOVIES— A team of engineers from General Electric and the Detroit Arsenal take motion pictures of an engine's insides while it is running. The technique, stroboradiography, enables engineers to study pistons, cams and moving parts under working conditions. Improved, lightweight designs are expected to be the payoff.

PRETTY HOT— The passion for keeping the Lincoln Continental looking like a new watch extends even to the exhaust pipe. The flexible hose between manifold and muffler gets a coat of Sicon heat resistant finish that maintains its color and gloss despite the heat. The black and aluminum finishes will hold their new look up to 1000°F. Colors stand 600°F.

AUTOMATIC DRILLING— Operators can slide a workpiece into a fixture on a tapping machine, press the start button, then watch the machine tap four holes to different depths, reverse and back out the taps. This takes place while the motor runs in one direction. The Ettco-Emerick machine uses Warner fractional horsepower forward and reverse clutches to preclude the need for a reversing motor.

Metalworking Outlook—p. 59 Market Outlook—p. 147

Mechanical forging press (2000 tons) at Alcoa, Cleveland

Guide to Hot Work Tooling

Charted on the next three pages are compositions, heat treatments and hardnesses of tool steels developed for hot forging, forming, extruding and molding dies

By H. E. REPLOGLE
Universal-Cyclops Steel Corp.
Bridgeville, Pa.

TOOL STEELS for hot work must be tough enough to resist work stresses; their composition must keep them from softening in service. They must have good resistance to wear and heat checking.

Toughness—Low carbon content —0.60 per cent and under for straight carbon steels, 0.50 per cent for low alloy types — gives the steels their needed toughness. Highly alloyed types contain lower carbons down to about 0.25 per cent minimum.

Chromium and nickel also are added to increase toughness. Except for the chromium-nickel types, toughness decreases with increasing amounts of alloying elements.

Hot Hardness—Alloys such as chromium, tungsten, vanadium and molybdenum give steels a resistance to softening in service.

As total alloy content increases, there is a general increase in the optimum hardening and tempering temperatures. The greater the ability to resist softening by tempering, the greater the ability to retain hardness at working temperatures after tempering.

Wear—Resistance to wear and heat checking is controlled by the carbon and alloy contents and is influenced by hardness.

The more carbon, alloy and hardness, the more wear resistance.

Susceptibility to heat checking increases with increasing carbon content. Hot work steels also are more susceptible to heat checking at a hardness which is too high and at one which is too low. For this property, each type of hot work steel has an optimum hardness range for individual applications.

Other Factors—Nonmetallurgical factors involved in the use of hot work tool steels include mechanical setup, preheating, cooling, die and tool lubrication, and scale or oxide on tools and dies.

Mechanical Setup—All forging tools and dies should be properly lined up. Machines should be true to assure uniform application of pressure or impact.

Dies in hand-fed and automatic forging machines should be adjusted to prevent the development of excessive pressure on the face of the dies. Dies should not be mounted in worn or warped shoes or holders.

Preheating—Well warmed dies and tools are less susceptible to cracking. During prolonged down times, dies should be kept warm.

Cooling—This retards localized overheating which may temper or soften the dies. Air cooling is the least drastic; it can be used on all types of tools. It also serves to blow away scale which will cause undue wear of dies.

Oil cooling is more severe and rapid, but is rarely detrimental to any tool or die. Water cooling is the most effective, but also is the most drastic and dangerous with highly alloyed tungsten steels. When large dies or punches reach high temperatures, water cooling tends to cause heat checking or even cracking. Small punches and dies often are cooled successfully with an ample flow of water.

Lubrication — Heavy, graphite-bearing greases serve as lubricants and prevent sticking. In most cases, they assure better wear.

Scale—Heat treating scale, if not excessive or in combination with carburization or decarburization, should be left on tools and dies. A scaly surface is extremely abrasion resistant, holds the lubricant on the tools and usually promotes better wear. Ground and polished tools will often gall or seize.

If grinding and polishing are necessary, tools and dies should be oxidized at a temperature just below that of tempering to form a protective oxide coating.

Composition, Heat Treatment and Hardness of Hot Work Steel

Tool Steels for Hot Forging, Forming and Extruding Ferrous Metals

	C	Mn	Si	Cr	V	Mo	Ni	W	Pre-Heat °F	High Heat °F	Quench*	Draw °F	Brinell Hardness	Properties and Applications
Flat Dies	0.60	0.70							1200	1450	W	500-700	350-500	Forging hammers. Flush quench carbon blocks face down and immerse at least 1 in. below deepest impression. Cool to about 450°F to prevent interior heat from softening surface. Quench oil-hardening blocks all over. Flush quench large blocks in the impression with a submerged oil jet. Start tempering under 300°F for oil baths and 400°F for air-type furnaces.
	0.70	0.30			0.20				1200	1500	W	500-700	350-500	
Machined or Cut Dies	0.60	0.70		1.00			1.50		1200	1500	O	600-1100	350-525	
	0.60	0.70		0.90		0.20			1200	1500	O	600-1100	350-525	
	0.60	0.80		0.75		0.25	1.50		1200	1500	O	600-1100	350-525	
	0.60	0.70		1.15	0.15	0.50			1200	1550	O	600-1100	350-525	
	0.60	0.60		0.90		0.70	1.75		1200	1550	O	600-1100	350-525	
Flat and Swaging Dies	Same as flat and machined dies													Hydraulic presses making large shafts, bars, blocks and special shapes.
Drop Forging Die Inserts	0.50	0.30	1.10	1.75	0.25	0.50		2.50	1400	1750	O	1200	400-450	Used to form entire forging or as small sections set into die block to strengthen or give increased wear at critical points.
	0.35	0.45	1.00	5.00	0.45	1.40			1400	1800	A	1100	400-450	
	0.35	0.35	1.00	5.00		1.70		1.35	1400	1800	A	1100	400-450	
	0.30	0.30	0.15	1.50	0.20	1.00	5.00		1300	1600	O	1100	400-450	
	(1)0.80	0.70	0.35	5.25	0.25	1.15			1400	1800	A	1150	400-450	(1)Die steel for making inserts with relatively shallow, simple impressions. Inserts shrunk into block or keyed in holder. Fits should be accurate. Ground surfaces recommended.
	(1)1.00	0.70	0.35	5.25	0.25	1.15			1400	1800	A	1175	400-450	
	**0.30	0.25	0.35	3.25	0.30			9.00	1450	2150	O & A	1200	400-450	
	**0.40	0.30	0.35	3.25	0.40			11.00	1550	2150	O & A	1225	400-450	
	**0.45	0.30	0.35	3.50	0.50			15.00	1550	2200	O & A	1275	400-450	
	**0.50	0.30	0.35	4.00	1.00			18.00	1450	2325	O & A	1100	495-555	
Valve Extrusion Dies	0.60	0.30	0.30	3.75	0.65			15.00	1550	2200	O & A	1225	460-525	Used to make automotive and aircraft valves.
	0.30	0.25	0.35	3.25	0.30			9.00	1450	2150	O & A	1150	460-525	
	0.35	0.30	0.35	3.25	1.00			11.00	1450	2150	O & A	1150	460-525	
	0.55	0.30	0.35	4.00	1.00			18.00	1450	2325	O & A	1100	495-555	
Press Dies, Preloaded	0.40	0.30	0.35	3.25	0.40			11.00	1550	2150	O & A	1100	540-580	Quick-acting forging presses. Inserts shrunk in alloy steel holders. Diameter of holder should be 2½ to 3 times diameter of insert. Insert should be 0.003 to 0.012 in. larger than hole in holder.
	0.45	0.30	0.35	3.50	0.50			15.00	1550	2200	O & A	1150	540-580	
Hot Forging Machine (Upsetter) Tools	(2)0.60	0.80		0.75		0.25	1.50		1200	1500	O	600-1100	350-525	Gripper and header dies.
	0.95	0.30	0.30	4.25	0.50	0.40			1450	1800	Air Blast	600-1100	350-525	
	0.50	0.30	1.10	1.75	0.25	0.50		2.50	1400	1750	O	600-1100	450-500	(2)This alloy usually purchased in heat treated condition, machined and put in service. Good for short runs.
	(3)0.35	0.45	1.00	5.00	0.45	1.00			1400	1800	A	600-1100	450-500	(3)These alloys withstand water cooling better than the high tungsten steels.
	(3)0.35	0.45	1.00	5.00		1.70		1.35	1400	1800	A	600-1100	450-500	
	(4)0.35	0.30	1.00	5.25		0.30		5.25	1400	1950	A	1075	450-500	
	(4)0.30	0.25	0.30	3.25	0.30			9.00	1400	2150	A	1150	450-500	(4)Alloys used for punches rather than dies with cavities.
	(4)0.40	0.60	1.50	7.50				7.50	1550	2150	O & A	1150	450-500	

Composition, Heat Treatment and

	C	Mn	Si	Cr	V	Mo	Ni	W	Pre-Heat °F	High Heat °F	Quench*	Draw °F	Brinell Hardness	Properties and Applications
Insert Dies	0.50	0.30	1.10	1.75	0.25	0.50		2.50	1400	1750	O	1200	400-450	Solid bar and tubular upsets. Used in one to five positions progressively to form the finished forging.
	0.35	0.45	1.00	5.00	0.45	1.40			1400	1800	A	1100	400-450	
	0.35	0.45	1.00	5.00		1.70		1.35	1400	1800	A	1100	400-450	
	**0.35	0.30	1.00	5.25		0.30		5.25	1400	1950	A	1175	400-450	
	**0.30	0.25	0.30	3.25	0.30			9.00	1400	2150	A	1200	400-450	
	**0.40	0.60	1.50	7.50				7.50	1550	2150	O & A	1200	400-450	
	**0.25	0.25	0.30	2.75	0.25			15.00	1550	2350	O & A	1200	400-450	
Hot Trimmer Dies	0.50	0.30	1.10	1.75	0.25	0.50		2.50	1200	1750	O	1225	425-475	Trimming flash from forgings.
	0.40	0.30	0.35	3.25	0.40			11.00	1500	2150	A	1200	425-475	
	0.50	0.30	0.35	4.00	1.00			18.00	1550	2300	A	1200	425-475	

Hot Work Steels for Aluminum, Magnesium and Zinc Diecasting

	C	Mn	Si	Cr	V	Mo	Ni	W	Pre-Heat °F	High Heat °F	Quench*	Draw °F	Brinell Hardness	Properties and Applications
Dies for Aluminum and Magnesium	0.35	0.45	1.00	5.00	1.00	1.40				1800	A	1100	425-444	Harden dies in controlled atmosphere furnace, salt bath or packed in spent pitch coke, used cast iron chips or 8 to 12 mesh aluminum oxide. Heat slowly to high temperature to minimize distortion. Many diecasters gas nitride the vanadium steel. A temperature of 975°F is recommended.
	0.35	0.45	1.00	5.00		0.30		5.25	1400	1950	A	1150	425-444	
Cores and Ejector Pins	[5]0.35	0.45	1.00	5.00	0.45-1.00	1.40			1450	1800	A	1100	425-475	[5]Alloy recommended for cores.
	[6]0.95	0.38	0.37	17.50		0.50			1450	1950	O	1050	425-475	[6]Alloy recommended for ejector pins.
Dies for Zinc	0.40	0.40							Used in annealed condition					
	[7]0.40	0.75		1.00		0.20			1200	1575	O	1300	225	[7]Alloy usually machined in heat treated condition.
	0.50	0.75		1.00	0.15				1200	1550	O	1300	225	
	[8]0.35	0.45	1.00	5.00	1.00	1.40			1450	1800	A	1100	425-475	[8]This steel used for long run dies for maximum life.
Dies for Brass	0.40	0.30	0.35	3.25	0.40			11.00	1550	2150	A or S	1225	425	
	0.25	0.30	0.30	2.75			2.00	10.00	1550	2000	A or S	1200	425	
	0.35	0.35	0.50	12.00	1.00			12.00	1550	2300	A or S	1200	425	

Tool Steels for Hot Forging and Extruding Brass

	C	Mn	Si	Cr	V	W	Mo	Others	Pre-Heat °F	High Heat °F	Quench*	Draw °F	Brinell Hardness	Properties and Applications
Forging Dies and Punches	0.35	0.45	1.00	5.00	0.45-1.00		1.40		1400	1800	A	1100	400-450	
	0.35	0.45	1.00	5.00		1.35	1.70		1400	1800	A	1100	400-450	[9]Application of these alloys usually limited to punches where maximum red hardness and wear resistance are necessary.
	0.35	0.30	1.00	5.25		5.25	0.30		1400	1950	A	1175	400-450	
	0.30	0.25	0.30	3.25	0.30	9.00			1400	2150	A	1200	400-450	
	**0.40	0.30	0.35	3.25	0.40	11.00			1550	2150	O & A	1225	400-450	
	**[9]0.45	0.30	0.35	3.50	0.50	15.00			1550	2200	O & A	1250	450-500	
	**[9]0.50	0.30	0.35	4.00	1.00	18.00			1550	2200	O & A	1250	450-500	
Extrusion Dies (Rods and Tubes)	0.35	0.30	1.00	5.25		5.25	0.30		1500	1950	A	1200	350-375	[10]This die steel must be mounted carefully in a suitable holder made from the heat treated alloy C 0.40, Mn 0.30, Si 0.35, Cr 3.25, V 0.40, W 11.00. Its use is more suited to abrasive and difficult-to-extrude alloys.
	0.40	0.30	0.35	3.25	0.40	11.00		Co 3.50	1500	2150	O & A	1250	350-375	
	0.45	0.30	0.35	3.50	0.50	15.00			1500	2200	O & A	1275	350-375	
	0.60	0.30	0.30	3.75	1.10	1.50	9.00		1550	2200	O & A	1275	350-375	
	0.50	0.30	0.35	4.00	1.00	18.00			1550	2300	O & A	1350	350-375	
	0.35	0.35	0.50	12.00	1.00	12.00			1550	2350	O & A	1380	350-375	
	[10]2.25			33.00		17.00		Co 44.00 Fe 2.00	Cast alloy; not heat treated					
	0.30	1.00	0.50	19.50		1.25	1.60	Ni 10.75 Ti 0.75	Austenitic superalloy, hardened by hot-cold work				250-280	

Hardness of Hot Work Steel

	C	Mn	Si	Cr	V	W	Mo	Others	Pre-Heat °F	High Heat °F	Quench*	Draw °F	Brinell Hardness	Properties and Applications
Extrusion Dies (Shapes)	0.35	0.30	1.00	5.25		5.25	9.00		1500	2200	O & A	1350	300-375	Choice of steel depends on shapes to be extruded, type and temperature of metal, and production required. High temperature extrusion of hard and abrasive metals requires steels with high red hardness and abrasion resistance.
												1300		
	0.40	0.30	0.35	3.25	0.40	11.00			1500	2150	O & A	1325	300-375	
	0.40	0.30	0.35	3.25	0.40	11.00		Co 3.50	1500	2150	O & A	1325	300-375	
	0.45	0.30	0.35	3.50	0.50	15.00			1500	2200	O & A	1350	300-375	
	0.60	0.30	0.30	3.75	1.10	1.50	9.00		1500	2200	O & A	1350	300-375	
Backer Blocks and Holders	0.50			0.65			0.35	Ni 1.75	1200	1525	O	750	400-450	Use well fitting holders and backers. Poor fits subject dies to unnecessary stresses which may promote breakage.
	0.50			1.00	0.20				1200	1650	O	750	400-450	
	0.50	0.30	1.10	1.75	0.25	2.50	0.50		1200	1750	O	1225	425-450	
	0.35	0.30	1.00	5.25		5.25	0.30		1400	1950	A	1125	425-450	
	0.30	0.25	0.30	3.25	0.30	9.00			1400	2150	A	1125	425-450	
Cutoff Knives	0.35	0.30	1.00	5.25		5.25			1400	1950	A	1050	475	Shearing butts of hot billets from extruded material.
	0.30	0.25	0.30	3.25	0.30	9.00	0.30		1500	2150	A	1150	475	
	0.40	0.30	0.35	3.25	0.40	11.00			1500	2150	A	1150	475	
Dummy Blocks	0.35	0.45	1.00	5.00	0.45		1.40		1400	1800	A	1125	400-425	Used in rotation in sets of six or seven, in direct contact with the hot billet to be extruded. Transmits pressure needed for extrusion.
	0.35	0.45	1.00	5.00		1.25	1.70		1400	1800	A	1125	400-425	
	0.35	0.30	1.00	5.25		5.25	0.30		1400	1950	A	1150	400-425	
	0.30	0.25	0.30	3.25	0.30	9.00			1400	2150	A	1150	400-425	
	0.40	0.30	0.35	3.25	0.40	11.00			1500	2150	A	1250	350-400	
Tube Extrusion Mandrels	(11) 0.35	0.45	1.00	5.00	0.45		1.40		1400	1800	A	1100	400-450	(11) Alloy best for water-cooled, horizontal press mandrels.
	(12) 0.30	0.25	0.30	3.25	0.40	9.00			1400	2150	A	1150	400-450	(13) Alloy best for oil-cooled, vertical press mandrels.
Tube Approach Dies	0.50	0.30	0.35	4.00	1.00	18.00			1550	2350	A	1350	375 approx.	Placed ahead of tube extrusion die. Relieves extrusion die of 100 per cent face contact with billet, assures lower die operating temperature.
Piercer Points	0.55	0.35	1.15	4.75	0.50		5.25		1550	2200	A	1200	400-450	Pierce a solid billet. Piercer screwed to long bar revolving rapidly in horizontal position. Billet revolves in opposite direction and piercer point forced through to make a complete longitudinal hole.
	0.25	0.40	0.40	2.75		9.00			1500	2150	A	1225	350-400	
	0.40	0.30	0.35	3.25	0.40	10.00		Ni 2.00	1500	2150	A	1225	350-400	
	0.45	0.20	0.35	3.50	0.40	15.00			1500	2200	A	1350	350-400	

Hot Work Steels for Extruding Aluminum

C	Mn	Si	Cr	V	W	Mo	Pre-Heat °F	High Heat °F	Quench*	Draw °F	Brinell Hardness	Properties and Applications
0.35	0.45	1.00	5.00		1.25	1.70	1200	1800	A	1100	425-450	Same type press and tools used for aluminum extrusions as for brass. Because temperatures are much lower, less highly alloyed steels are required. All tools, extrusion dies, dummy blocks, mandrels, etc. can be made from one steel.

* W—Water; O—Oil; A—Air; S—Salt.

** These alloys used for punches or die sections that are buried in hot metal.

This is one of Motorola's checks for tube socket quality. The device indicates the amount of force needed to insert or extract a tube

Even incoming material from its own factories is checked. The apparatus tests power transistors used in automobile radios

Sample Your Incoming Quality

Motorola Inc., Chicago, uses a lot sampling plan. Parts meet predetermined standards; inspection costs are down. The system is fair to both supplier and buyer

YOU can't afford to inspect every part you receive, believes Motorola Inc., Chicago. With components coming from more than 800 suppliers, the Chicago firm knows the real dollars and cents significance of these rules:

You've got to be sure you're getting good parts without inspecting every one.

A large part of your product's reputation rides with your supplier's quality.

System — Here are the basic steps involved in the inspection procedure used:

1. Standardize the inspection of parts with written procedures for each category purchased. 2. Use a table based on probability laws to show how large a sample should be checked.

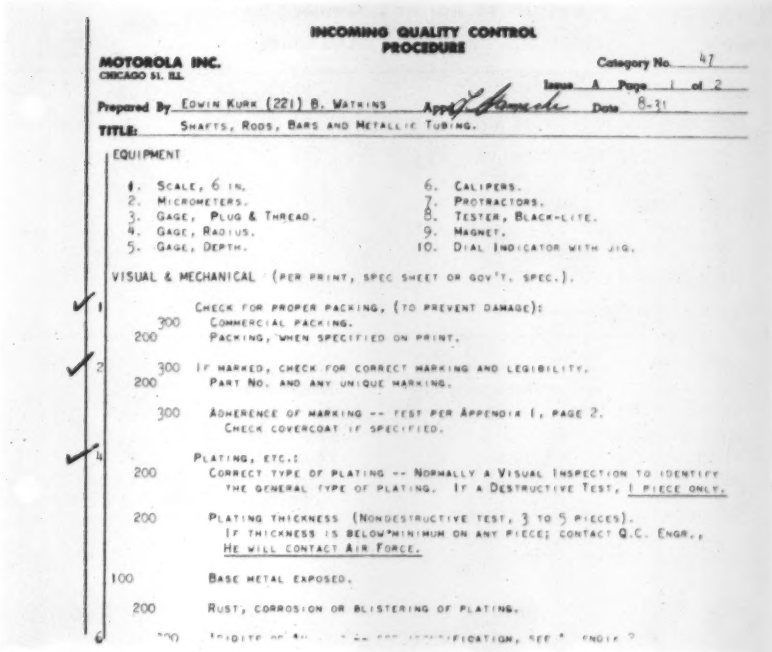
"There are two risks involved in sampling," points out Gus Mydill, Motorola's director of incoming quality. "One is that the accepted lot quality is poorer than the sample indicates—that's our risk. The other is that the quality of a rejected lot is better than the sample—that's the supplier's risk. Our method is effective and fair; it has brought few complaints from our suppliers."

Mechanics—Here's how Motorola's system works. After the engineering department has designed the product, the purchasing department submits prints and specifications to suppliers.

On receipt of a satisfactory quotation, purchasing authorizes a supplier to proceed with the necessary tooling and submit a specified number of preproduction pieces. These samples are given complete mechanical, electrical and environmental tests. If the parts are acceptable, the order is placed.

Inspection procedures have been written for 85 categories of parts. Based on experience in quality control, each procedure lists equipment needed to make the inspection and several visual, mechanical and electrical tests. Each step is coded according to an acceptable quality level—the highest average percentage of defects that occurs in acceptable lots.

Table — Motorola's inspection table lists the number of parts to be inspected for each lot size and the percentage of defects permissible for each acceptable quality



INCOMING QUALITY CONTROL PROCEDURE

MOTOROLA INC.
CHICAGO 51, ILL.

Category No. 47
Issue A Page 1 of 2

Prepared By EDWIN KURK (221) B. WATKINS Appd J. Hancock Date 8-31

TITLE: SHAFTS, RODS, BARS AND METALLIC TUBING.

EQUIPMENT

1. SCALE, 6 IN.
2. MICROMETERS.
3. GAGE, PLUG & THREAD.
4. GAGE, RADIUS.
5. GAGE, DEPTH.
6. CALIPERS.
7. PROTRACTORS.
8. TESTER, BLACK-LITE.
9. MAGNET.
10. DIAL INDICATOR WITH JIG.

VISUAL & MECHANICAL (PER PRINT, SPEC SHEET OR GOV'T. SPEC.).

✓1 CHECK FOR PROPER PACKING, (TO PREVENT DAMAGE):
300 COMMERCIAL PACKING.
200 PACKING, WHEN SPECIFIED ON PRINT.

✓2 300 IF MARKED, CHECK FOR CORRECT MARKING AND LEGIBILITY.
200 PART NO. AND ANY UNIQUE MARKING.

300 ADHERENCE OF MARKING -- TEST PER APPENDIX I, PAGE 2.
CHECK COVERCOAT IF SPECIFIED.

✓4 PLATING, ETC.:
200 CORRECT TYPE OF PLATING -- NORMALLY A VISUAL INSPECTION TO IDENTIFY THE GENERAL TYPE OF PLATING. IF A DESTRUCTIVE TEST, 1 PIECE ONLY.

200 PLATING THICKNESS (NONDESTRUCTIVE TEST, 3 TO 5 PIECES).
IF THICKNESS IS BELOW MINIMUM ON ANY PIECE; CONTACT Q.C. ENGR., HE WILL CONTACT AIR FORCE.

100 BASE METAL EXPOSED.

200 RUST, CORROSION OR BLISTERING OF PLATING.

6 [illegible] SEE * ENDIX 2

Predetermining quality standards saves arguments. A procedure like this one spells out equipment, specifications. It's a handy reference

level. A second sample may be taken under certain conditions.

Three general acceptable quality levels are used:

Major—Defects which could prevent operation, cause failure, prevent assembly, reduce materially the usability of product, materially reduce external appearance and affect sales.

Minor A—Defects which will not materially reduce usability of product but may interfere with assembly or repair operations.

Minor B—Defects which deviate from standards of good workmanship but have little or no significant bearing on function, assembly, life or interchangeability.

The accepted quality level for major defects is 2.5 per cent; for minor A, 6.5 per cent; for minor B, 15 per cent. The table contains other degrees of quality levels which engineers may set up if none of the three general levels is satisfactory. For example, a high priced critical part might require an acceptable quality level of only 1 per cent defects.

Method — An inspection of a 1000 piece shipment would work like this:

1. According to the table, right, 801 to 1300 parts call for the inspection of 75 pieces in the first sample.

2. In the same column (under Acceptance Numbers) are listed the defects permissible (C_1 number) for various levels of quality. (In this case, four or less major defects, nine or less minor A defects and 19 or less minor B defects.)

3. If the first inspection step is coded major, then there must be four or less defects for the lot to be accepted. If the second step is a minor A, then there must be nine or less defects.

4. Suppose more than four but less than nine defects were found in the first sample. Then a second sample of 150 pieces must be taken. If the defects number eight or less (C_2 number) for the two hundred twenty-five pieces, the lot is still acceptable. For nine or more defects, the lot would be rejected.

Should the records of the supplier show that past quality level is lower than standard, the inspectors can use the "Tightened Inspection Level" column at far right under which acceptance numbers are smaller.

Combination — Most parts are given more than one test, and the acceptable quality level for each test may vary. If there were one major, one minor A and one minor B test in the inspection procedure of a 75 piece sample, there could be 32 pieces defective and the lot would still be acceptable. In practice, Motorola officials report that lots are rarely rejected because of excessive minor B defects. The supplier is given a warning.

Motorola handles rejected shipments in two ways:

1. The entire shipment may be returned to the supplier.
2. Or 100 per cent inspection will be made at the supplier's expense.

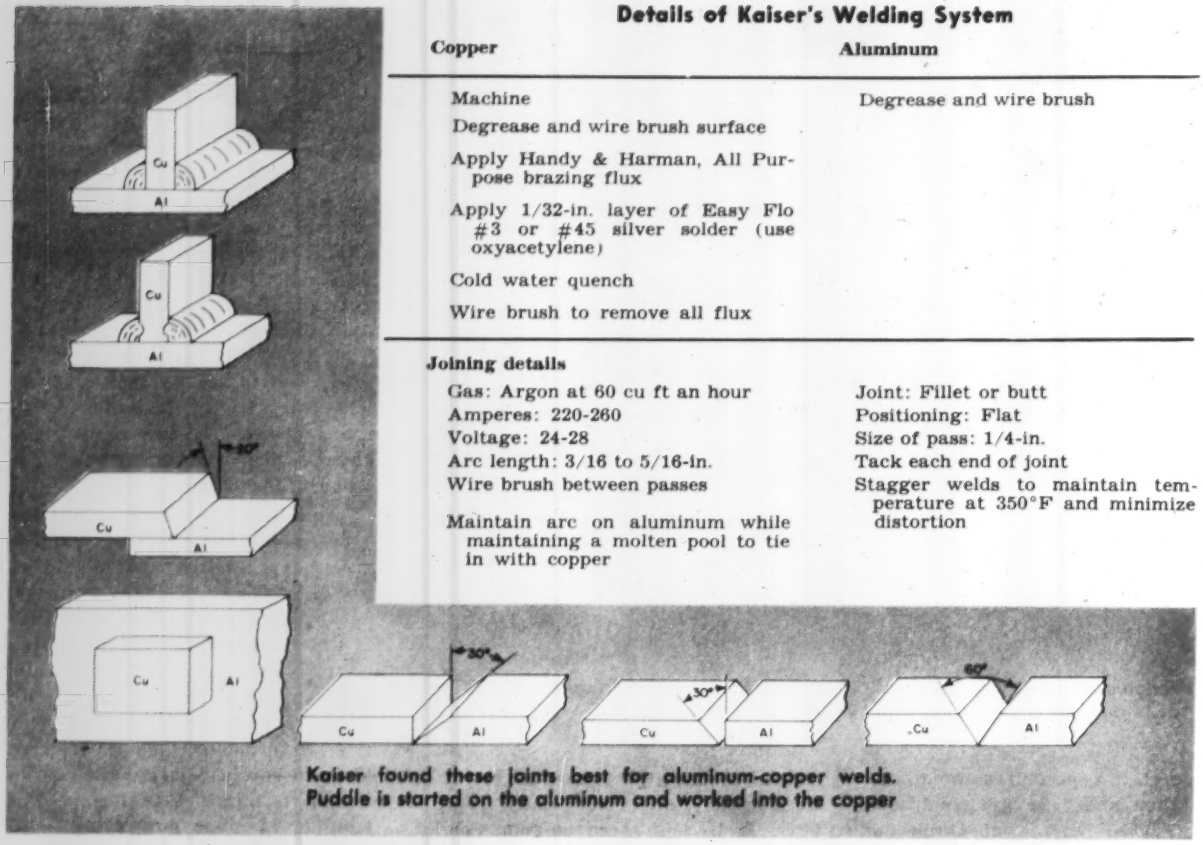
** An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

Standard Sampling Inspection Table

Lot Size	26 to 40	41 to 65	66 to 110	111 to 180	181 to 300	301 to 500	501 to 800	801 to 1300	1301 to 3200	3201 to 8000	8001 to 22000	22001 to 110000@
First Sample Size	7	10	15	25	35	50	50	75	100	150	200	300
Second Sample Size	—	—	—	—	—	—	100	150	200	300	400	600

Acceptable Quality Level (AQL) (Per Cent Defective)	ACCEPTANCE NUMBERS																Tightened Inspection Level (AQL) (Per Cent Defective)
	C_1	C_1	C_1	C_1	C_1	C_1	C_1	C_2	C_1	C_2	C_1	C_2	C_1	C_2	C_1	C_2	C_1	C_2	
0.65	*	*	*	*	*	0	0	2	1	2	1	5	2	6	3	7	4	10	1.0
1.0	*	*	*	*	0	1	1	3	1	5	2	5	3	7	4	9	6	16	1.5
1.5	*	*	*	0	1	2	1	5	2	7	3	7	5	13	6	16	8	25	2.5
MAJOR																			
2.5 (100-199)	*	*	0	1	2	3	2	6	4	8	5	11	7	18	9	24	12	35	4.0
4.0	*	0	1	2	3	4	3	9	5	11	7	16	11	28	12	35	18	54	6.5
MINOR A																			
6.5 (200-299)	0	1	2	3	5	6	6		9		11		17		21		32		10.0
10.0	1	2	3	5	7	9	9		13		16		24		30		44		15.0
MINOR B																			
15.0 (300-399)	2	3	4	7	10	13	13		19		24		34		43		63		25.0
25.0	3	5	7	11	15	20	20		29		36		53		68		98		30.0

Symbols:
*Use sample size in first column to the right. When sample size equals or exceeds lot size, do 100% inspection.
@Lots larger than 110,000 use final column.



Details of Kaiser's Welding System

Copper	Aluminum
Machine	Degrease and wire brush
Degrease and wire brush surface	
Apply Handy & Harman, All Purpose brazing flux	
Apply 1/32-in. layer of Easy Flo #3 or #45 silver solder (use oxyacetylene)	
Cold water quench	
Wire brush to remove all flux	

Joining details

Gas: Argon at 60 cu ft an hour	Joint: Fillet or butt
Amperes: 220-260	Positioning: Flat
Voltage: 24-28	Size of pass: 1/4-in.
Arc length: 3/16 to 5/16-in.	Tack each end of joint
Wire brush between passes	Stagger welds to maintain temperature at 350°F and minimize distortion
Maintain arc on aluminum while maintaining a molten pool to tie in with copper	

Kaiser found these joints best for aluminum-copper welds. Puddle is started on the aluminum and worked into the copper

Welding Aluminum to Copper

BRAZE welding aluminum to copper is a routine production method at Kaiser Aluminum & Chemical Corp., Spokane. A first coat of silver solder is used as a buffer to prevent the formation of brittle $CuAl_2$ during welding.

The electrical industry needs aluminum-copper joints that will stand elevated temperatures. The Kaiser braze welded joints have shown excellent, maintenance-free service under severe operating conditions. In addition, the joints will conduct more electrical current than a bolted joint of the same size.

How It's Done—To get satisfactory welds, two steps are needed: 1. The weld area is coated with a 1/32-in. layer of Easy-Flo No. 3 silver solder. 2. Sections are positioned and welded with BAlSi-1 filler wire using the inert gas, metal arc process.

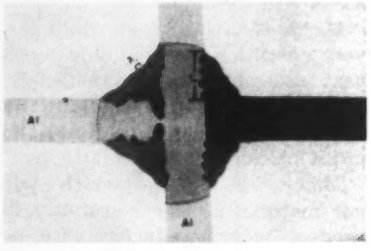
Welding procedure is similar to aluminum welding, with this exception: The arc is not directed against the silver solder face. A back washing motion forces the molten aluminum filler metal against the silver solder. This permits fusion without excessive melting.

Interpass temperature is held below 350°F by cooling to prevent excessive dilution of the silver solder.

Quality Control—Good inspection is necessary to get the best welds. Inspectors must be familiar with the process, and must control each step visually.

According to L. A. Cook and M. F. Stavish of Kaiser's metallurgical research department, quality control should include:

1. A check of joint cleanliness.



This side view of a tensile specimen shows typical fillet needed for maximum strength. Copper is ¾-in. thick; aluminum is 1 in.

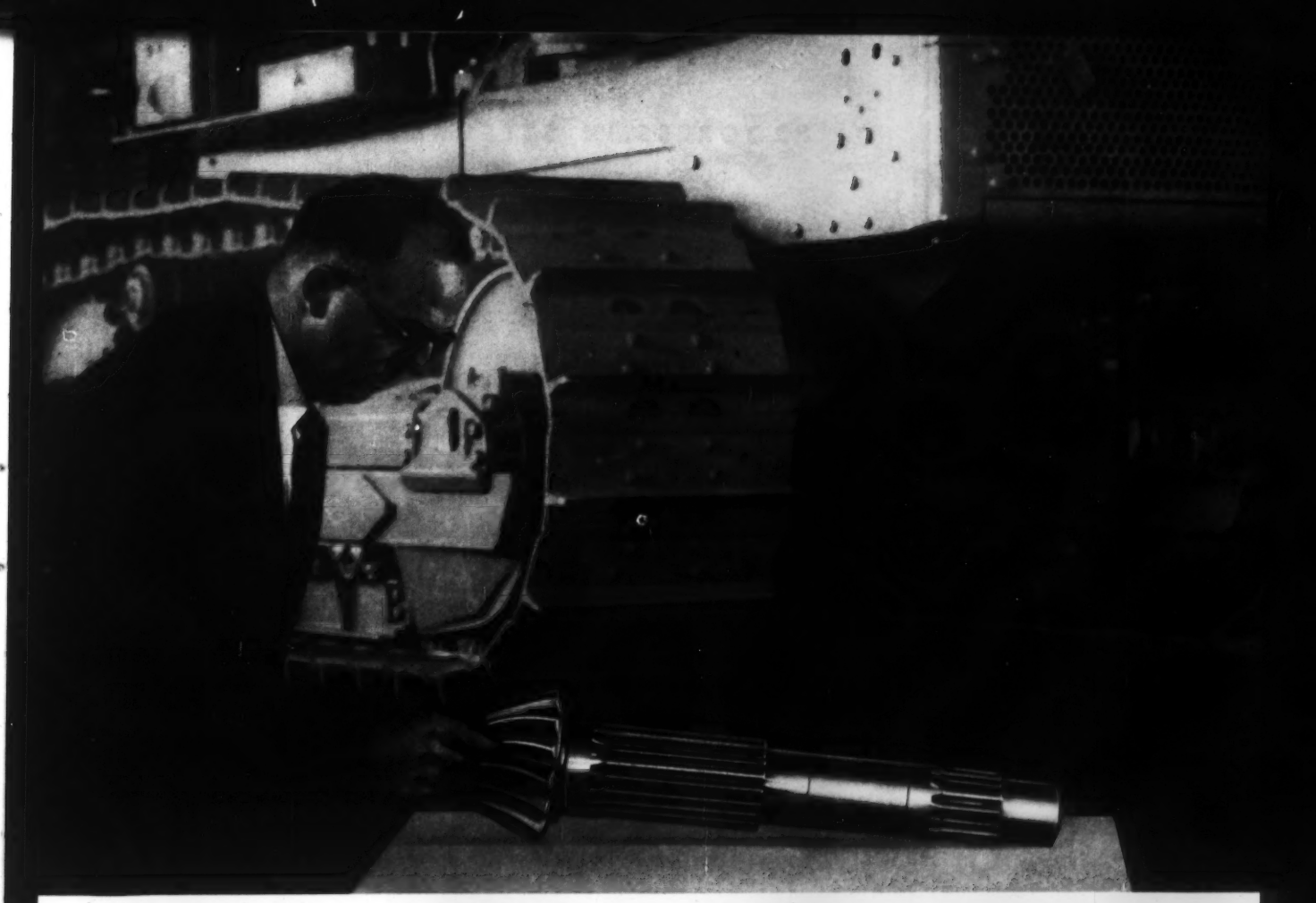
2. Inspection of the silver solder to insure that the bond is good.

3. Complete removal of the brazing flux before welding.

4. Observation of welding to insure that the correct filler wire is being used, that the interpass temperature is below 350°F, that the surfaces between interpasses are clean and that the finished dimensions are correct.

5. Nondestructive tests.

Kaiser says that welders are easily trained to produce consistently good joints with properties equal to the aluminum base metal.



Caterpillar Tractor Co. Metallurgist T. H. Spencer inspects final drive pinion for D9 crawler tractor weighing 28 tons. Severe loading of this large pinion requires a steel with high case and core hardenability. Several years ago Caterpillar Tractor Co. found that simply by increasing the molybdenum content of AISI 8622 (to 0.30-0.40%), the desired properties were obtained at lower cost than was possible in any of the standard carburizing grades.

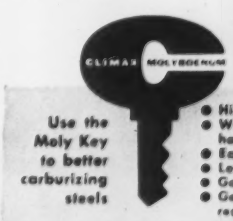
Caterpillar Tractor Co. improves case and core hardenability of carburizing steel by increasing molybdenum content

"Drive pinions in tractors must take very high torque loads," says T. H. Spencer, Metallurgist for Caterpillar Tractor Co. "AISI 8622 steel, which we had been using, couldn't give us the hard case and strong, tough core we needed in these heavy sections. Other standard carburizing steels with the requisite properties would have cost substantially more. We found, however, that we could achieve the desired surface and core properties by simply modifying AISI 8622 with a higher percentage of molybdenum. We have been using this composition for several years, and results have been excellent."

Caterpillar Tractor Co.'s experience shows how increasing molybdenum in a carburizing steel helped to solve a specific problem. Perhaps your product, too, can benefit by higher molybdenum content.

A technical article, "New Carburizing Steels for Critical Gearing", describes some recent investigations of higher-moly carburizing steels. For a reprint, write Climax Molybdenum Company, Dept. 3, 500 Fifth Avenue, New York 36, N. Y.

CLIMAX MOLYBDENUM



Use the Moly Key to better carburizing steels

- High case hardness
- Wide choice of hardenability
- Easy to heat treat
- Low distortion
- Good machinability
- Good wear resistance

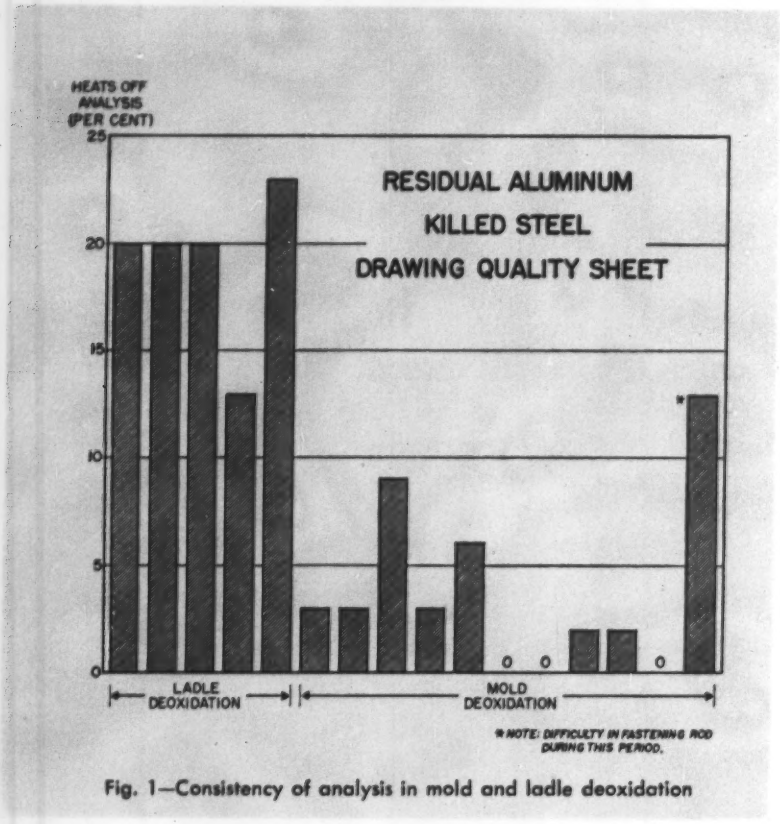


Fig. 1—Consistency of analysis in mold and ladle deoxidation

Deoxidizing in the mold with 99 per cent pure aluminum rod uses less aluminum and improves quality of the steel. Important: The rod must be securely fastened

Aluminum Rod Upgrades Killed Steel

By ED LONG
Project Director
and
BRUCE E. BRENNAN
Supervisor, Engineering Data
Reynolds Metals Co.
Louisville

DEVELOPMENT work aimed at finding the most effective method and product for adding aluminum to steel points up the advantages of using commercially pure rods fastened securely in the mold.

This technique permits the aluminum to melt evenly and disperse uniformly through the steel. The deoxidation reaction continues steadily throughout the pouring. Reynolds Metals Co. is working on a process to add the rod to the mold continuously at a predetermined rate.

Killed Steel—Making killed, semi-killed and rimmed steel by the open hearth process is largely an operation of oxidation followed by deoxidation.

The carbon content of the molten metal must be reduced by a reaction between the carbon and iron oxide in the slag. When the carbon approaches a satisfactory level, the bath is deoxidized by adding metals that have a high affinity for oxygen.

In Furnace—As much deoxidizing as possible should be done in the furnace to reduce the deoxidation products in the ingot. Ferromanganese is the chief furnace deoxidant.

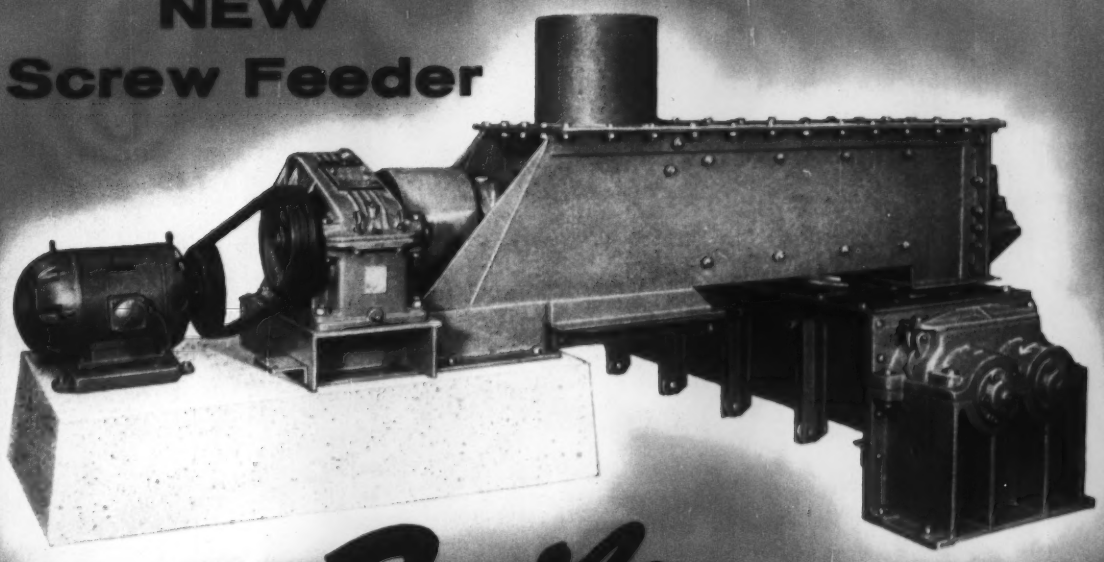
Furnace deoxidation does not remove all oxides, and some reoxidation occurs during tapping. Additional deoxidizing generally is done in the ladle, by adding ferrosilicon and aluminum shot, sticks or notched bar.

When aluminum is added to the ladle, generally there is considerable oxidizing of the aluminum at the surface and appreciable losses of aluminum to the slag.

Mold—Deoxidizing in the mold uses less aluminum and improves the quality of the steel, particularly in deep drawing grades. In addition, a few hundredths per cent of residual aluminum is effective in promoting fine grain structure.

It has been common to toss aluminum shot into the mold as the steel was poured. This gave relatively good uniformity in the product, but the consumption of aluminum through mechanical losses

NEW Screw Feeder



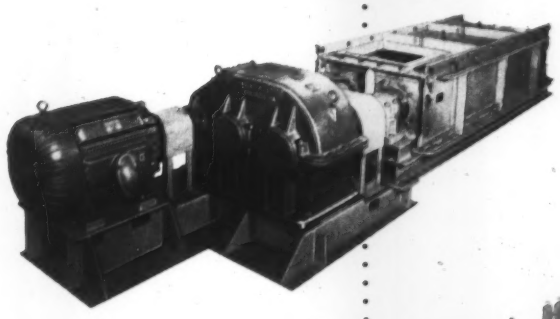
MAKES *Bailey* PUG MILLS

EVEN MORE EFFECTIVE IN SINTERING PLANT AND BLAST FURNACE DUST CATCHER SERVICE

The new Bailey Screw Feeder is effective for flow regulation and conveying of flue dust, ore fines and various other materials. An outstanding feature is that it maintains uniform flow, even when irregular feeding may be caused by "hanging" of material in dust catcher or a sudden furnace "slip." The feeder speeds the sintering process and assures substantial savings through reduced handling costs.

BAILEY PUG MILLS were developed for low-cost processing of greater tonnages of more uniform sintered products. They are built for continuous service, in capacities from 100 to 400 tons per hour.

Write for Bulletins



This Bailey Double Shaft Pug Mill is equipped with a double helical gear reduction unit. Types of Bailey Pug Mills available include single and double shaft types, with direct or rope drives.

WILLIAM M. *Bailey* COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD PITTSBURGH 16, PA

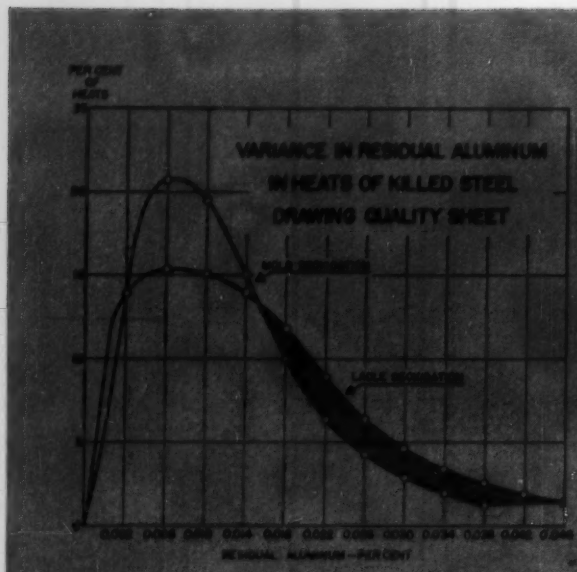


Fig. 2—Varying residual aluminum content in mold and ladle deoxidation

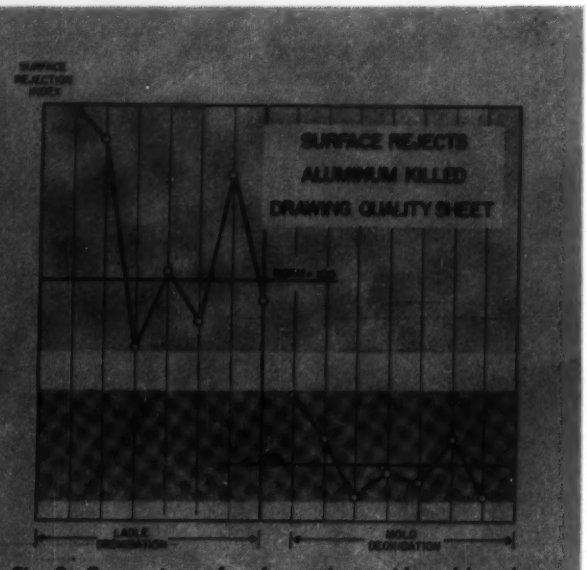


Fig. 3—Comparison of surface rejects with mold and ladle deoxidation

and in the deoxidation reaction is high.

How Much—Three factors determine the amount of aluminum necessary for producing fine grained steel: 1. Mechanical losses in making the addition. 2. Amount oxidized in the deoxidation reaction. 3. Quantity of residual required for a fine grained structure.

The amount used varies with steelmaking practice—from a few ounces to about 4 lb per ton of steel.

Requisite—Aluminum added to the ingot mold should be a product that will allow the plant metallurgist to calculate accurately its deoxidizing effectiveness and the amount of residual aluminum in the ingot.

Rods have been used for mold deoxidation, but generally as cut lengths formed into various shapes and thrown into the mold, or simply bent to form a hook on one end and hung over the lip of the mold. The buoyancy of aluminum in molten steel frequently caused the rod to float.

Secured Rod—In the production of aluminum-killed, deep drawing sheets, the use of mold deoxidation with 99 per cent pure rods fastened to the mold has allowed a reduction of 2 lb of aluminum per ton—a 50 per cent saving. Savings also are made with other types of steel, varying with the degree of deoxidation and the residual aluminum needed.

Development work carried on with a prominent steel producer was carefully documented to provide a reliable gage of the characteristics of various deoxidation techniques. The graphs on these pages are based on statistics covering periods during which both the ladle and mold deoxidation methods were used.

Residual Standard—Fig. 1 shows the per cent of heats in which one test was outside the standard for residual aluminum. It compares periods during which aluminum was added to the ladle with periods using mold deoxidation. Each bar represents 30 heats.

The five bars representing ladle deoxidation show that of the 150 heats, about 18 per cent were off analysis. A significant improvement in analysis consistency resulting from mold deoxidation is evident. The bars which represent some 300 heats of mold deoxidation (omitting one at right) show less than 5 per cent off analysis.

The bar on the right represents a period during which inconsistency resulted because of difficulty from insecure fastening of the rods, and points up the importance of securely fastening the rod to overcome its tendency to float on the molten steel.

Residual Content—Fig. 2 illustrates the varying amounts of residual aluminum in heats of killed steel, drawing quality sheets that were deoxidized by the mold and ladle methods. An appreciable narrowing of the spread of residual aluminum as a result of mold deoxidation is evident.

Fig. 3 illustrates the significant reduction in surface rejects as a result of using mold deoxidation in place of the ladle method.

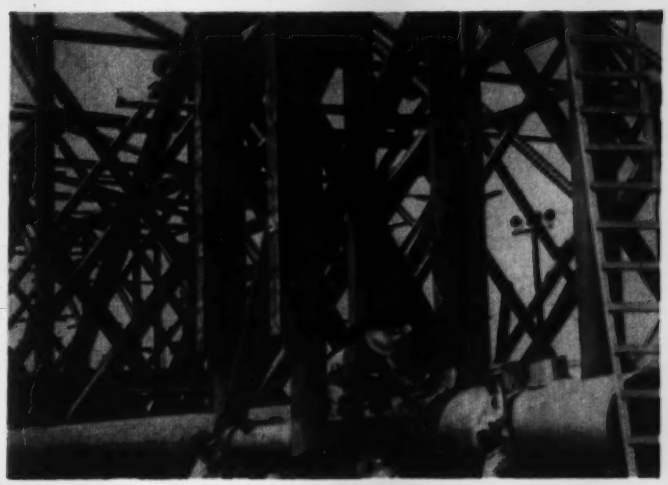
Rods — The commercially pure aluminum rods used were hot rolled to size. The steel industry can expect additional economies to come from Reynolds' work in continuous casting of commercially pure aluminum in rod sizes suitable for direct use in ladle deoxidation.

Savings in the amount of aluminum used for making killed steel is an advantage to both the steel and aluminum industries.

It allows steel producers to cut costs and saves aluminum to be fabricated into other products. The steel industry used more than 90 million lb of aluminum in 1952 for deoxidation purposes.

A...v...d...

specialist in Steel Fabrication



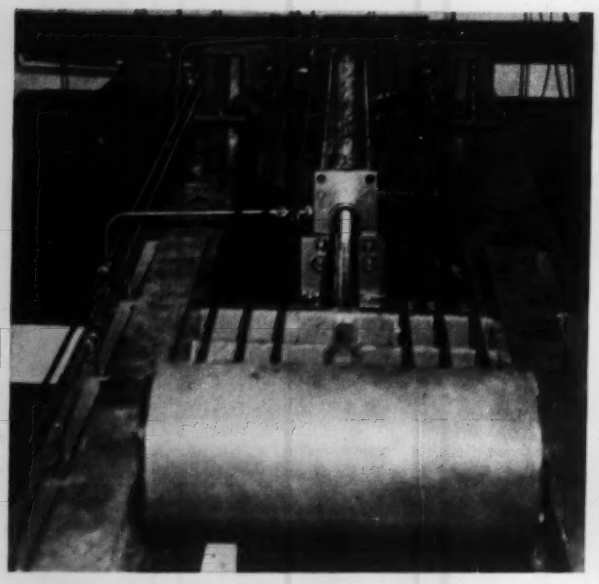
When you think of Avondale, it is only natural to think of steel . . . for Avondale has taken steel and used it to build their name and fame. Particularly noted for specialized steel fabrication, Avondale is world-famous for their pipe jackets, offshore rigs, steel ships and barges. Avondale's steel working equipment is far advanced—a new large capacity bending roll at the Main Yard is the latest addition to an already splendidly equipped facility. Next time . . . call Avondale.

SHIP BUILDING • SHIP REPAIRING • FOUNDERS • PROPELLERS • STRUCTURAL STEEL

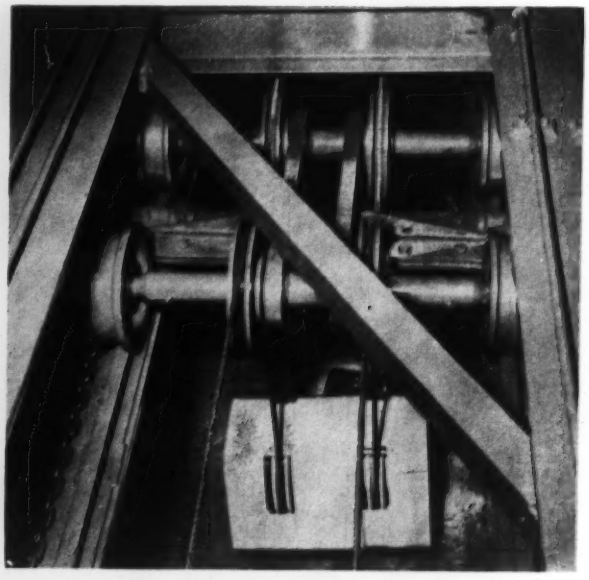
AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

STEEL

P.O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U.S.A.



Hydraulic mechanism for providing lift . . .



Means greatly simplified trolley design

Overhead Crane Goes Hydraulic

When an equipment maker replaced electric crane power with a hydraulic system, substantial savings turned up in speedier operation, reduced maintenance and lower cost

OVERHEAD CRANES and electrically powered movement naturally go together—or they did until Shaw-Box Crane & Hoist Division of Manning, Maxwell & Moore Inc., Muskegon, Mich., asked: Do they? The result is a hydraulic, overhead traveling crane. Its only electric motor drives a hydraulic pump.

The prototype is a 3-ton model, but Shaw-Box engineers have designs for models whose capacities go up to 10 tons. (This range covers about 70 per cent of the cranes purchased.)

Savings — Apparent advantages of the crane are: 1. Infinitely variable speed under any load. 2. Less maintenance than a multimotored electric counterpart because many complicated mechanisms have been eliminated. 3. Cost approximately 10 per cent less than comparable three-motored cranes.

Drives—Power for the crane motions—hoist, trolley travel and bridge travel—is supplied by a Dudco, constant delivery, hydraulic pump of the vane type. It is driven by a 10-hp, squirrel-cage, single speed motor. The pump has a capacity of 12 gpm and provides 2000 psi at 1200 rpm.

The trolley traverse mechanism consists of a 1¼-hp Dudco, vane type hydraulic motor, connected to a speed reducer unit. This drives the trolley by means of a roller chain loop running the length of both bridge girders and back to the ends of the trolley. The chain loop is entirely concealed in the girders.

Bridge Control—The bridge is similarly powered by Dudco, 1¼-hp, vane type hydraulic motors, mounted to speed reducer units at opposite ends of the bridge. Roller chain drives connect speed reducers to wheel axles on the bridge trucks. This drive was selected for its simplicity, reliability and low cost.

The hoist mechanism consists of a hydraulic cylinder, piston and rod with a 4-ft stroke, and two crossheads (one movable) on top of the bridge girders, each carrying six cable sheaves. The cable is reeved over the crosshead sheaves before passing to the trolley sheaves where it loops downward to the lifting block.

Lift Ratio—The block is supported by four parts of cable. The net over-all mechanical advantage of the lifting cable is such that for every foot of piston stroke, the

When a Lassie meets a Massey

Coming through the Rye

Massey-Harris-Ferguson that is, neighbor, whom you'll find in the rye and the wheat and all over farms 'round the world — because M-H-F products are vital to profits in farming.

And at Massey-Harris-Ferguson resistance welding is just as vital to profits in manufacturing.

The combination of ingenious production engineering and Sciaky resistance welding techniques achieves economy usually associated with mass production . . . *but* it achieves this economy on short runs of a wide variety of parts!

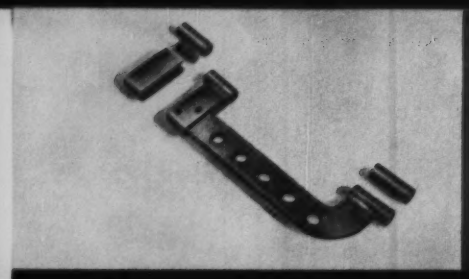
If you want to combine mass production economies with short production runs . . . look into Sciaky resistance welding — just like Massey-Harris-Ferguson did!

SCIAKY®

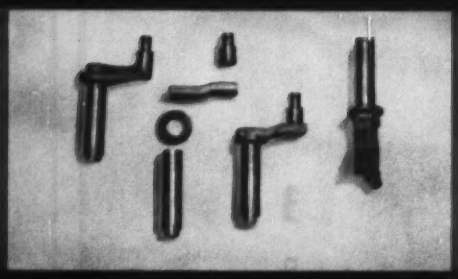
Largest Manufacturers of Resistance Welding Machines in the World

One of Massey - Harris - Ferguson's proudest achievements — the 90 Custom Special Self-propelled Combine.

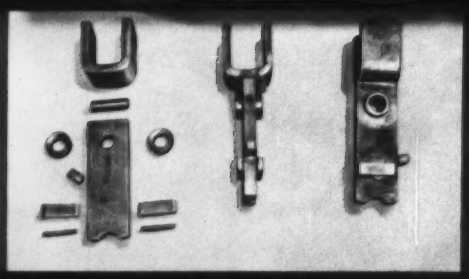
Turn the page—Take a look for yourself at just a few of the advantages . . .



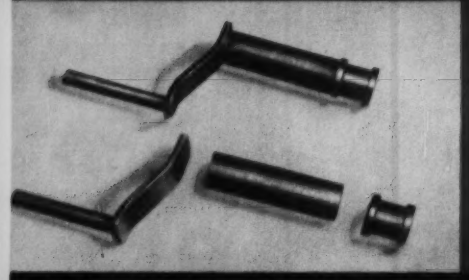
DRAW BAR AND KEEPER—Save 19¢ each over arc welding



BELL CRANK—Save 65¢ each over arc welding

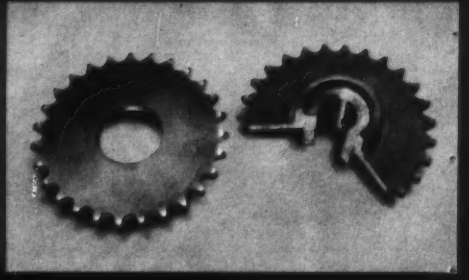


YOKE—Save $3.45¢ each over arc welding, more satisfactory product



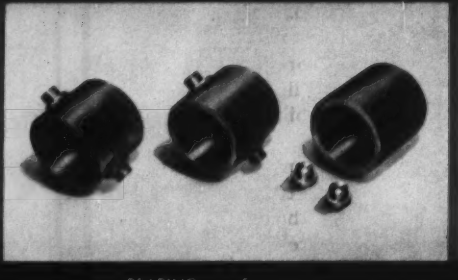
CRANK—Save $29 per hour of production over castings

LATCH—Save 4.29¢ each over arc welding

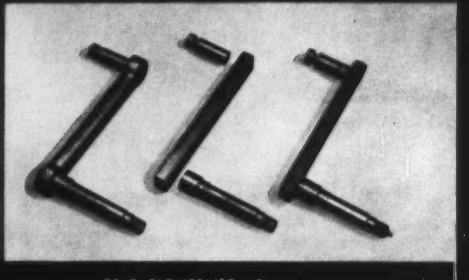


SPROCKET—Save $17.60 per hour of production over arc welding

UNIVERSAL—Save $19.40 per hour of production over arc welding



BEARING—Save over $1.00 each over casting



BELT TIGHTENER—Save $1.24 each over brazing

Mass Production Methods with Sciaky Techniques save up to 60% on short run fabrication

Impressive cost reductions are only part of the Massey-Harris-Ferguson story — versatility, speed, and quality combine to result in an unusual success with a wide variety of short run applications.

Over 200 assemblies, formerly fusion welded, cast, or forged, are now made from standard, off-the-shelf stock and screw machine products. Average set-up time for resistance welding is only *30 minutes*. Fixturing costs have been reduced to less than $75.00. The field performance has been excellent!

Three standard Sciaky Three-Phase balanced load welders are used by M-H-F. Control set-ups for any job are quickly made from performance data charts. Production time is never wasted in try-out to prove weld quality.

"Resistance Welding At Work", Vol. 5, No. 1, tells the whole M-H-F story. Write for your free copy of this dramatic proof of Sciaky Basic design thinking — resistance welding techniques to put the profits back into manufacturing.

For specification welding such as required for air frame, jet engine and ordnance manufacture ask about the new Sciaky Predetermined Electronic Counter Weld Control.

One of three standard Sciaky welders in use at M-H-F showing the fixturing for producing a yoke.

Largest Manufacturers of Electric Resistance Welding Machines in the World

SCIAKY.

Sciaky Bros., Inc., 4924 W. 67th Street, Chicago 38, Illinois, POrtsmouth 7-5600

bottom block moves 3 ft.

For the maximum lift of 12 ft, a piston stroke of 4 ft is all that was necessary with the sheave arrangement used. Layouts have been prepared for all-hydraulic cranes with a 10-ft cylinder and with similar cable reeving to give a 30-ft lift. For a hoisting speed of 30 fpm with this design, piston speed will be 10 fpm (piston rod loading will be three times the load on the crane hook). Though full load speeds of the 3-ton capacity crane are 175 fpm for the bridge, 100 fpm for the trolley and 18 fpm for the hoist, other speeds may be easily obtained.

Lighter—Use of hydraulics on this crane has made it possible to eliminate the following components of multimotored units: Crossshaft, crossshaft bearings and bearing support brackets, bridge brake, three wound rotor motors to power the hoist, trolley and bridge (replaced by one squirrelcage motor), three electric controllers (replaced by one simple line starter), three banks of resistance, all bridge cross wires and their current collectors, hoist limit switch, hoist solenoid brake, hoist load brake or equivalent electrical control equipment and contactors, rope winding drum, hoist gearing and heavy trolley frame required to carry the usual hoist and traversing machinery.

Bridge Structure—Bridge girders, instead of being the usual reinforced I-beams or box sections, are either two I-beams or single web girders connected across the top with diagonal bracing. The result is substantially a single girder with unusual lateral stability.

Engineers at Shaw-Box have also designed a hydraulic crane circuit with two pumps, both driven by the same motor. A high pressure pump with low volume in combination with a low pressure high volume pump is arranged so that pumps will cut in and out automatically, depending upon the load on the hook. The empty hook can be raised and lowered at high speed, and full load raised or lowered from zero to full load speed —all with infinitely variable speed control.

Coolants for Automation

Multiple requirements of automated machining lines make cutting fluid selection critical. Here are five points that belong on the check list

THE MAN who had a fair amount of success using most any old gunk as a cutting fluid for machining is likely to find himself out of business if he transfers this haphazard practice to automation.

With automation, cutting fluid selection calls for the same analytical approach that you use for equipment and tool design.

Quintet—According to John A. Boyd, vice president, Van Straaten Chemical Co., Chicago, the successful coolant for automation must have a tailored equilibrium of five elements: Film characteristics, lubricity, stability, detergency and versatility.

"Each element," he says, "must be refined to fit special requirements of the individual line and then delicately balanced in relation to the others." Guesswork is replaced by science.

Film Characteristics—This is one of the prime elements.

Film residue of a coolant can range from hard, granular, crystalline deposits to soft, oily films of the mineral oil compounds. Hard residues, probably no problem on individual machines, can accumulate on gages and fixtures on the automatic line . . . can cause fouling or incorrect gaging. Maintenance costs may soar as it becomes necessary to service these parts more often.

Lubrication — Part of the coolant's job may be to lubricate. Because many moving parts and gages used on automated lines require fluid film lubrication for continuous functioning, compounds should be selected with this in mind.

Life—Mr. Boyd's third element is coolant stability. Most big automation units are fed from a central system. When the coolant becomes unusable, the line has to be shut down while from 5000 to 50,000 gallons of coolant are pumped out and replaced. The longer the coolant is serviceable, the less often this down time occurs.

Standards of stability for coolants start at three months. Coolants guaranteed for this period often work for more than a year. In field applications, Mr. Boyd says, the top limit hasn't been reached.

Tidy—Build-up of sludge or chips around moving parts and fixtures can interfere with—even stop— the machinery. Coolants should have enough detergent action to keep deposits from gathering. It's important that this detergency be finely balanced with the lubricity.

Versatility — Many automatic lines double up on operations, doing both heavy metal cutting and grinding. Some new compounds, notably solubles, have a dual-purpose anatomy that meets the needs of both operations.

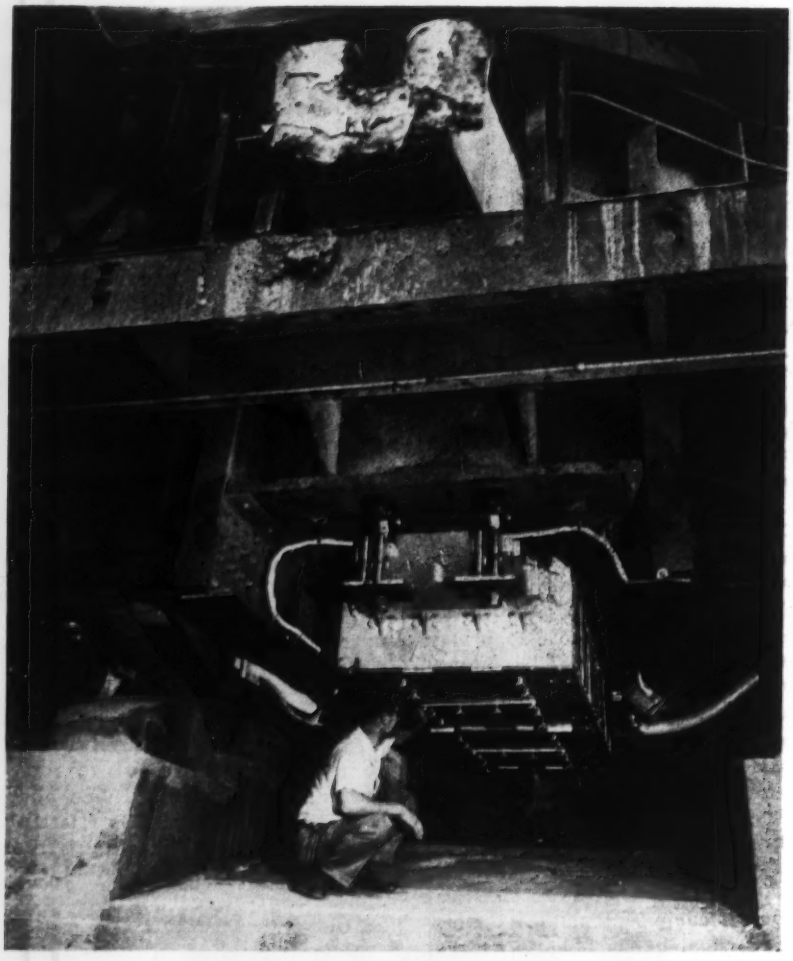
Mr. Boyd says that recent developments in coolants have turned up products that have extremely good lubricating characteristics for cutting operations. At the same time, they're engineered to provide the cleaning needed to keep the grinding wheel free cutting. They will become more important, he predicts, as more varied operations are brought into the machining line.

Progress Report

Ceramic cutting tools are passing one field test after another. George Barnes, sales engineer, Norton Co., Worcester, Mass., reports that results from about 30 tests with Norton's ceramic tools show that "aluminum oxide as a cutting tool will find a new and important place in industry."

In one test, ceramics turned and faced AISI 4620 forged steel gear blanks with a 29-in. OD, 15-in. length and 12-in. bore. Working at 850 sfpm, the tools lasted 90 minutes. At 350 sfpm, cemented carbide tools lasted only 25 minutes on the same job.

Alloy steel foundry finds that they bring reductions in refining time, give better grain control and allow accurate prediction of final alloy adjustments



Induction stirrer mounted beneath the 50,000-lb capacity furnace

Induction Stirrers Upgrade Cast Steel

INDUCTION stirrers will be used to make better alloy castings at General Electric Co.'s steel foundry in Schenectady, N. Y.

One stirrer will soon be operating on one of the foundry's two electric arc furnaces. The second unit is being installed.

This is a first for the foundry industry. Previously, stirrers were used only in steel mills in the production of ingots which later were rolled or forged.

Why—In electric furnaces, a metal bath that is static during refining slows down metallurgical reactions. Alloying elements tend to stratify, and temperature distribution is uneven. Accurate sampling of high alloy melts is practically impossible.

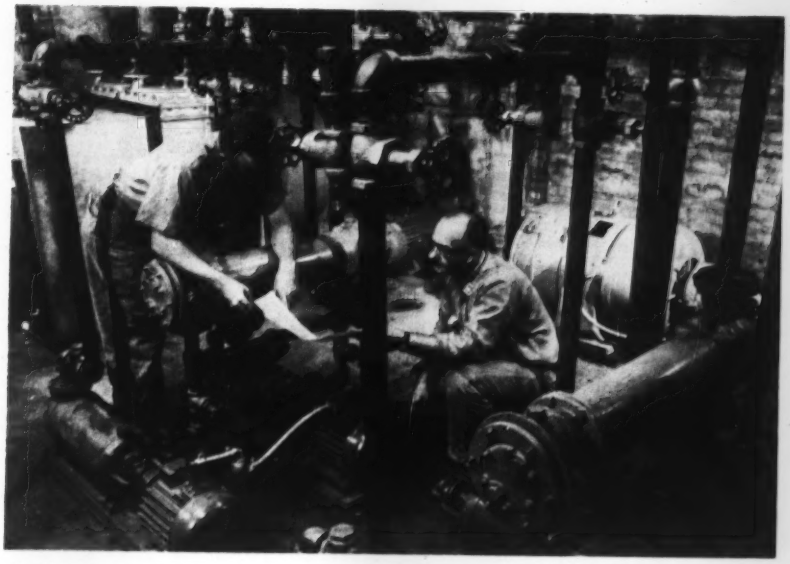
Various manual and mechanical methods have been used to mix and stir the metal, but in most cases they are not completely effective.

Stirrer—The induction stirrer, a Swedish invention, is a watercooled coil resembling a segment of the stator in a large 2-phase induction motor. The coil is encased in a steel box, which is curved lengthwise to fit the furnace contour.

The stirrer coil assembly is suspended about 1 in. below the stainless steel furnace bottom. The flow pattern is achieved by exciting the 2-phase winding with low frequency, alternating current.

How It Works — The rotating magnetic field in the coil induces eddy currents in the molten metal.

Main control board for stirrers is on floor between two electric arc furnaces



Cooling system for stirrers and furnaces is mounted above the main control room

The magnetic field produced by these currents tries to follow the rotating excitation field, creating a stirring force which moves the metal in the furnace across the hearth bottom, upward and sideward.

Results: Impurities such as phophorous and silicates are almost completely removed with little or no loss of metal; sulphur impurities are reduced to about one-third of the best levels attainable by conventional practice; grain size in austenitic steel can be better controlled because furnace temperatures are uniform; final alloy adjustments can be accurately predicted; chemical stratification is minimized, and sample analyses are representative of the entire heat; refining time is reduced.

Furnaces—The induction stirrer is installed on a 13.5-ft diameter, 50,000-lb capacity furnace; the foundry's other furnace is 11 ft in diameter and has a capacity of 25,000 lb. Both units annually produce 13,500 tons of electrically melted steel for castings.

Eleven direct current, General Electric motors and one motor generator set are used in the operation of the furnaces and the induction stirrers.

Two water cooling systems are used on each furnace. One is for normal operation; the other is a stand-by for emergencies.

Each system uses 16 gallons of water a minute.

Protection—Stirrer coils are protected from overheating by a temperature actuated warning system. Thermistors installed at various positions on the furnace bottom indicate the temperature of the water in the coil cooling system and the furnace bottom.

The temperature measuring devices will trip an alarm system when the maximum safe temperature is exceeded. When the alarm system for the furnace bottom is tripped, a horn sounds and the stirrer stops. If the coil or its coolant becomes overheated, a bell sounds and the stirrer stops.

Signal lights indicate the nature of the trouble, and the hot spot is found by manipulating the indicating temperature dials on the panel which can be connected into any one of the thermistors.

Excitation—Current is supplied to the stirrers on both furnaces by a special, single phase, commutator type generator (1.4 cycle, rated at 250 kva at 0.2 power factor). It is driven by a 3-phase, slip-ring induction motor (280 hp, 60 cycle, 440 v, 1770 rpm).

A specially built Schrage phase and frequency converter with a rotating primary and regulation windings and stationary secondary windings provide the excitation.

The rotating magnetic field generated by the current flowing in the stirrer coils can be made to move in either of two opposite directions. This means the metal flow in the furnaces can be directed up at the spout for pouring or up at the slag door for slag-off operations.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

How would you GAGE THIS DIMENSION 10 times or 10,000 times?

The number of workpieces you have to gage has a lot to do with the type of gage you use.

It is claimed that 75% of all metalworking production is made up of small lots of 25 workpieces or less. This emphasizes that in most cases it is important to carefully select gages at the lowest cost commensurate with necessary accuracy.

When a manufacturer makes only certain types of gages, he naturally recommends these for all applications. For instance, a manufacturer who specializes only in Dial Indicating Gages obviously cannot meet every modern gaging requirement. Neither can an Air Gage manufacturer honestly recommend his type of gage for every measuring job. Those who buy the wrong gage can't be blamed if they don't know the facts.

Federal makes a complete line of all types of gages employing practically every system of visual gaging. Listed in our catalog and readily available from stock are countless Dial Indicator Gages ideally suited for everyday inspection of small runs. When a higher degree of accuracy, foolproof operation, and faster gaging are required, the purchase of a Federal Dimensionair Air Gage may pay big dividends. And where large production warrants the investment, we design and build automatic gages for high speed sorting and machine control.

Before you decide what gages you need, bring your problems to Federal. Our engineers, without bias, will suggest the *best* solution . . . and may save you considerable money. Write or call us today.

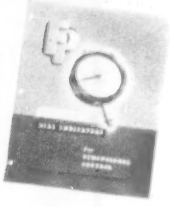
FEDERAL PRODUCTS CORPORATION
6219 Eddy Street • Providence 1, R. I.

FEDERAL'S SOLUTION TO THE COST OF GAGING:
Impartial Gage Selection
Engineering Follow-Through
Everything in Gages

Ask **FEDERAL** *First*
FOR RECOMMENDATIONS IN MODERN GAGES . . .

DIAL INDICATORS

Lowest in first and last cost. Gage up to one ten-thousandth of an inch (.0001") and sometimes to half a tenth (.00005"). Exceedingly adaptable, fast, and simple. Ask for Catalog 55.



DIAL INDICATOR GAGES

The Federal line is complete — includes all types of Dial Indicator Gages . . . snap, hole, depth, caliper, etc., and special. Ask for Catalog 55G.

MODIFIED GAGES

Federal Catalog Gages can often be modified at slight expense to meet special gaging requirements. Bring your problems to us. Ask for Catalog A-445.

AIR GAGES

Air Gages have their own particular advantages, and on certain jobs are practically foolproof. With AirProbes they can be applied to dimensions that are inaccessible by other methods. Ask for Dimensionair Catalog No. 56D.

AUTOMATION GAGING SYSTEMS

Machine tools, glass tube and wire covering machines, etc., can be automatically controlled to produce work which is dimensionally accurate. Ask for Catalog 56AM.

AUTOMATIC GAGING & SORTING

Federal uses any and all gaging systems and can select the one best suited for accuracy, speed and convenience. Federal Gages automatically gage and sort workpieces of all shapes and sizes. Ask for Catalog No. 55AG.

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

Vertical Rolling Mill Progressively Compacts Metal Powders

The No. 061 vertical mill has its work rolls in a horizontal plane.

Metal powder is fed vertically into the rolls from a hopper located above the roll housings. A chute beneath the rolls delivers compacted strip ready for sintering.

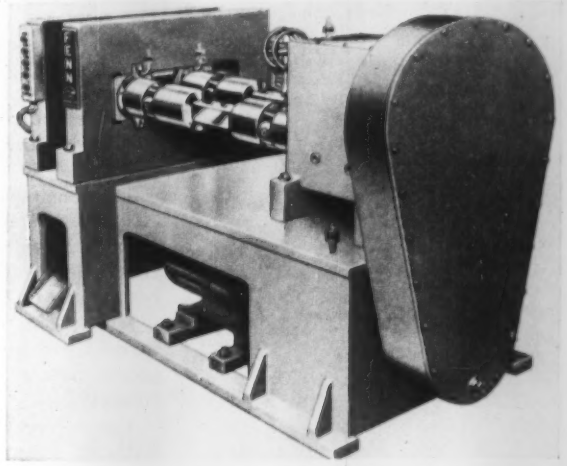
Precision-ground 6 x 8 in. work rolls are powered by a heavy duty universal drive that transmits heavy torque.

Maximum separating force is 150,000 lb, and a 15-hp, four-speed drive provides rolling speeds of 5 to 30 fpm.

Continuous cut-tooth herringbone roll drive pinions are made of special alloy steel and virtually eliminate gear chatter.

Duplex handwheels are used for screw-in adjustment, and gear ratios permit manual operation under full load.

The process of compacting a metal powder by rolling may be applied to individual, mixed or alloyed metal powders, with or without the inclusion of nonmetallic constituents.



Typical materials produced by this method are refractory metals, including tungsten and tantalum, and superhard metals, including cemented carbides. *Write*: Fenn Mfg. Co., Newington, Conn. *Phone*: Mohawk 6-2471

Airless Blasting Barrel Automates Cleaning of Parts

All operations of this airless blast unit, including material handling, weighing and the starting and stopping of the barrel's rotation, are automatic.

Foundries, forge shops, heat treating plants and other metalworking facilities which clean and descale parts can change the blasting cycle in seconds to suit the part being cleaned.

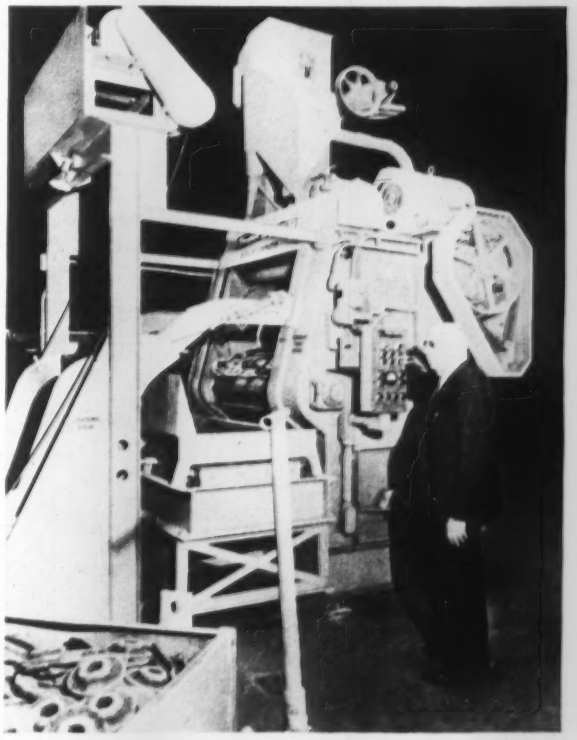
In a large operation, several automatic blasting barrels can be grouped in a line to receive dirty castings from the shakeout by way of a conveyor which feeds the loading skip of each machine.

When a load of a predetermined weight is in the skip, a switch automatically stops the feeding conveyor. The dirty castings are dumped automatically into the barrel as soon as the previous load is discharged.

While the skip returns to be filled with another load of dirty castings, the door of the barrel shuts, the barrel begins to rotate and a wheel begins to throw abrasive.

After a predetermined period, blasting stops and a short period of tumbling takes place to drain the abrasive from the work.

Then the barrel stops, the door opens, the barrel reverses direction and the cleaned castings are dumped out of the barrel onto another conveyor.



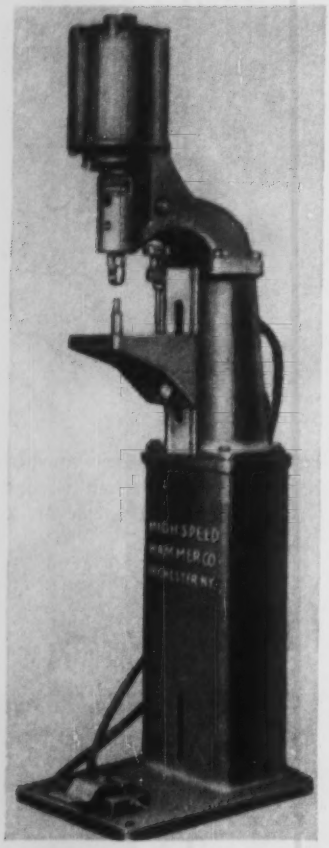
The barrel comes in 6, 12, 18 and 27 cu ft sizes. *Write*: Pangborn Corp., Hagerstown, Md. *Phone*: Hagerstown 3500

NEW PRODUCTS and equipment

Rivet Spinner Head

This noiseless head is designed for automatic setups.

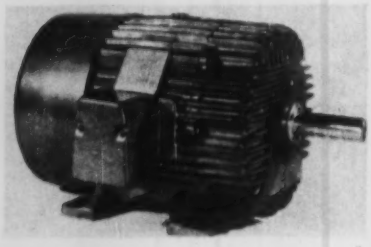
Rivet capacity is 5/16-in. The spindle travels ¾-in. and can be



adjusted downward. *Write*: High Speed Hammer Co., 500 Norton St., Rochester 21, N. Y. *Phone*: Congress 6740

Integral Motors

This line of induction motors (up to 30 hp) is designed in NEMA frames. They are smaller, lighter and more compact than previous designs.



Controlled synthetics, which are high in dielectric strength and resistance to damage from moisture, heat, abrasion and corrosion, are used in the insulation. *Write*: Crocker-Wheeler Division, Elliott Co., Jeannette, Pa. *Phone*: Lafayette 3-5422

Spotweld Sealer

Parweld elastic sealer compound eliminates electrode failure caused by the formation of copper oxide.

The compound does not affect electrode or welding bar life. It provides watertight, corrosion-free joints which have minimum resistance to welding current.

More than 850 welds can be made directly through the compound before pitting becomes noticeable.

The compound will adhere without running or sagging on oiled sheets and will hold its form for 45 minutes at 350°F.

Bonderizing solutions and hot water do not affect the compound. *Write*: Parr Paint & Color Co., 18312 Syracuse Ave., Cleveland 10, O. *Phone*: Kenmore 1-1070

Cap Screws

Micro sizes, No. 0 to No. 3, have been added to a line of heat treated, alloy steel socket cap and setscrews. A line of stainless steel screws has also been introduced.

The alloy steel screws come in cup, cone, oval, half-dog and flat points. *Write*: Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O. *Phone*: Vulcan 3-3700

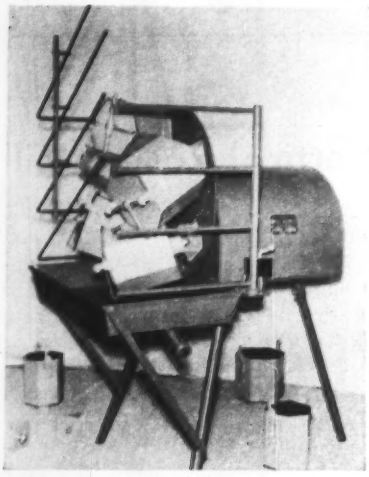
Barrel Finishing

Model MMB eliminates hand finishing of metal and plastic parts.

As many as ten finishing barrels, 3 to 8 in. in diameter, can be mounted on the 24-in. revolving disc.

Several finishing operations can be conducted simultaneously, using several barrels with different combinations of parts, media and compounds.

As the disc revolves, parts receive a rotary, centrifugal and slide-honing action. Burrs, flash, tool marks, paint, plating and heat



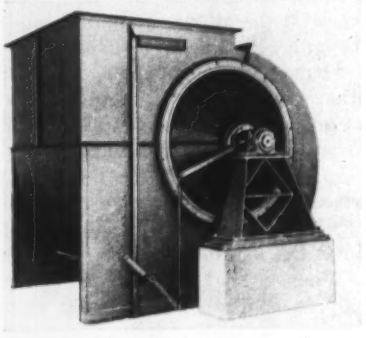
treating scale are removed without affecting tolerances.

The speed range is 15 to 45 rpm. *Write*: BMT Mfg. Corp., 151 E. Ninth St., Elmira Heights, N. Y. *Phone*: Elmira 7388

Centrifugal Fans

Heavy duty Airfoil fans are available in single and double inlet construction for volumes up to 1 million cfm.

The fans operate at a mechanical efficiency of more than 92 per cent and a static efficiency of over 88.5 per cent.



Improved design of inlets, wheel rims and housings contributes to high efficiency. *Write*: American Blower Corp., Detroit 32, Mich. *Phone*: Trinity 2-4300

Air-Cooled Engine

Model VH4 is a 30-hp, 4-cylinder engine that operates at a top speed of 2800 rpm.

The high torque design of the V-type unit provides power to operate harvesters, combines, balers, light tractors, construction and oil

You get what you want with

DANLY

MASTER MECHANIC

Ever wish you could build your own presses? Danly does it for you . . . putting in the same extra strength you would to avoid down-time, working to closer tolerances as you would to protect your dies.

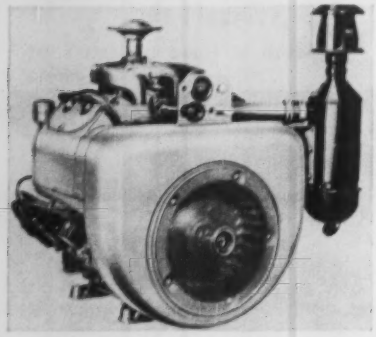
Danly Presses are built the way you want them. Take Danly's lubrication system, for instance . . . it's automatic to safeguard the press against human error and protects vital wear surfaces with oil to assure longer life.

You get what you want with Danly Presses.

DANLY MACHINE SPECIALTIES, INC.
2100 So. Laramie Ave. • Chicago 50 • Ill.

Ask for your copy of The Danly "Press Catalog" . . . it gives the whole story on how Danly Presses are built for you. Write today.

DANLY ®



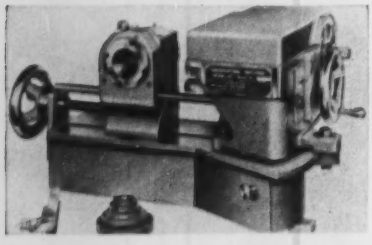
field equipment, material handling equipment, etc.

It can be adapted to run on kerosene, natural gas, LP fuels or fuel oil of 38-42° Baume and 25 octane. *Write*: Wisconsin Motor Corp., Milwaukee, Wis. *Phone*: Evergreen 4-5800

Graduating Machines

This unit graduates machine tool dials and handwheels.

From 40 to 1000 graduations, with many combinations of length

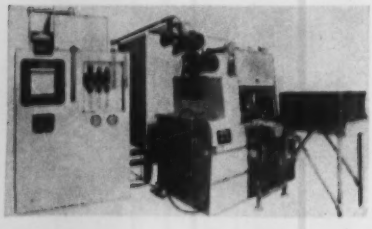


or line, can be made. *Write*: Abrasive Machine Tool Co., East Providence, R. I. *Phone*: 1-0549

Furnace

The Casemaster is a controlled atmosphere furnace which is available in front charge, discharge batch type and straight-through models.

The furnace, which comes in various sizes, can be used for gas



carburizing and carbonitriding, clean hardening, martempering and controlled atmosphere annealing.

Temperatures, once set, are held constant. The carbon potential is maintained automatically by a generator.

Both gas and electrically heated models use the radiant tube principle of heating. *Write*: Department D-5, Industrial Furnace Division, Sunbeam Corp., 4433 W. Ogden, Chicago 23, Ill. *Phone*: Crawford 7-3225

Rotary Pumps

Five series of internal gear pumps use circular tooth design in rotors and idlers. Results are: Rolling contact, smoother engage-

ment of teeth, less friction and high volumetric efficiency.

The pumps handle liquids with light to heavy viscosities from 3 to 300 gpm. Two speed ranges have 650 and 1800 rpm limits. *Write*: Wayne Pump Co., 132 Tecumseh St., Ft. Wayne, Ind. *Phone*: Eastbrook 4664

Centering Machine

This machine handles camshafts and crankshafts. Production rate: 360 pieces an hour.

It uses two opposed automatic drilling units. The operator merely loads the part into a fixture and depresses the start switch. The work is automatically clamped, centered at both ends and unclamped. *Write*: Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich. *Phone*: Tyler 4-6144

Pin-Type Arbors

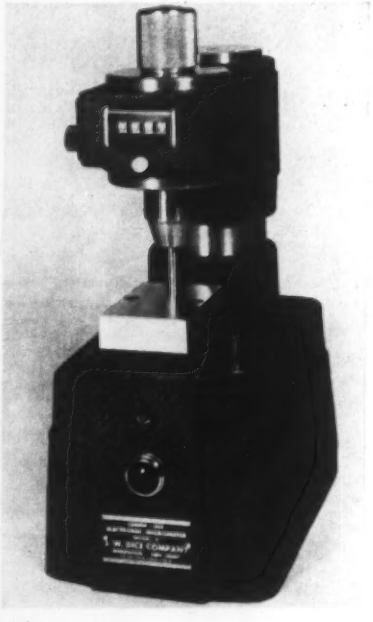
Precision machining of splined bore gear blanks is speeded by this arbor. It has regularly spaced pins around its body. When a gear blank is loaded on the arbor, the pins fit into the internal splined bore.

When the gear blank is rotated, the pins move up ramp-type cams and are forced into line contact with adjacent splines near the pitch line. This locks the part firmly to the arbor because the pins apply equal force all around the splined bore to eliminate play.

Thrust from turning or grinding operations keeps the part from loosening. *Write*: Scully - Jones & Co., 1901 S. Rockwell, Chicago, Ill. *Phone*: Bishop 7-5900

Automatic Micrometer

Model HDR is an electronic unit that makes direct readings automatically. The front of the instrument displays the reading in ten-thousandths of an inch. Five divisions between each digit on the unit wheel permit readings to



Lapointe Machine Tool Company, Hudson, Massachusetts

FIRST OF ITS KIND IN THE WORLD!

...And It's Lubricated by Cities Service Pacemaker 400 T Oil!

LAPOINTE MACHINE TOOL COMPANY, originator of the broaching method of cutting metal over 50 years ago, has now originated the first vertical broaching machine with variable speed electro-mechanical drive.

Purpose of the huge, gear-driven machine is to increase tool life up to 500% through smoother operation, thus saving down time and producing more accurate work.

Selection of a lubricant for the new machine was of special importance because of the tremendous pressures it develops: normally 30,000 pounds, sometimes up to 60,000 pounds. Of the many brands of lubricants Lapointe tested, Cities Service Pacemaker 400 T had the necessary requirements for the job . . . so naturally, this superior lubricant got the job.

"We test the machines with Pacemaker 400 T at the factory and then put it in again when the broaches are assembled at the buyer's plant," says Lapointe. "It offers all the characteristics we need: Good film strength, high viscosity index, and exceptional anti-foam and anti-oxidant qualities. Needless to say, we're pleased and impressed with this Cities Service lubricant."

Like scores of others, Lapointe has discovered the search for a proper lubricant ends at the Cities Service label. Altogether, there are hundreds of Cities Service products for the exacting needs of industry. For more information, talk with your nearby Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

Quick Facts About New Broaching Machine

USES: Now used for broaching aircraft engine turbine buckets, but can be adapted to general broaching.

ADVANTAGES: Increases tool life 400-500% through smoother operation, less down time. Produces more accurate work. Variable cutting speed: 12 to 75 FPM. Available in single or double ram models with 72" to 100" stroke.

Quick Facts About Pacemaker 400 T Oil

USES: Propulsion turbine units where oil is circulated under heavy pressure. Widely used in naval and commercial vessels, high speed industrial machinery.

ADVANTAGES: High viscosity index, excellent heat resistance and film strength. Chemically fortified against oxidation, rust, and foaming.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

20 millionths of an inch.

Measuring range is 1 in.; throat depth is 2 in. The upper head is adjustable to accommodate work up to 2 in. *Write*: J. W. Dice Co., Englewood, N. J. *Phone*: Englewood 4-0471

Ram Type Manipulators

These automatic ram type manipulators will rotate 360 degrees. Both ram travel and travel of the unit on the track are controlled by an electronic variable speed drive which has a speed range of 5 to 100 ipm (or any desired 20:1 ratio).

A motorized double chain lift, plus a counterweight in the column and a brake motor, move the ram vertically. Ram deflection and sideways deviation are held to a minimum. Dynamic braking stops the ram instantly.

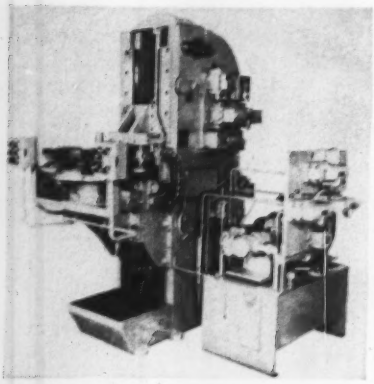
The unit may be moved easily within the shop. *Write*: C. B. Herrick Mfg. Corp., 2000 Center St., Cleveland 13, O. *Phone*: Cherry 1-6185

Broaching Machine

The T-6-24 is a 6-ton vertical push-down broacher with a 24-in. stroke.

The machine illustrated has been tooled to assemble bushings into cover parts and burnish in a continuous operation. Production is 400 parts an hour.

Tooling consists of a two-station push head, dial-type index unit for carrying cover parts through the operations, a magazine and transfer slide for feeding bushings and



a magazine and return for burnishing balls. *Write*: American Broach & Machine Co., Ann Arbor, Mich. *Phone*: Normandy 2-5621

Bronze Welding Rods

Three extruded oxyacetylene rods are for braze welding and conventional welding of malleable iron, cast iron, brass and bronze with dirty, oily or greasy surfaces.

The heavily coated rods are made in four diameters: 1/8, 3/16, 1/4 and 3/32-in. *Write*: Air Reduction Sales Co., division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y. *Phone*: Murray Hill 2-6700

Hydraulic Press

This 500-ton press can be used for many metalworking applications including stitching, forming and binding.

Closing speed is 8 seconds; opening speed is 6 seconds.

A low pressure, fast pumping system uses a combination of hydraulic pressure and mechanical leverage that virtually eliminates the oil leakage problem. *Write*: Electric Steel Foundry Co., 2141 N. W. 25th Ave., Portland 10, Oreg. *Phone*: Capitol 8-2141

Cloth Buff

The centerless cloth buff is made of superior quality cloth which is sewed double for firm, hard cutting. It adds versatility to the buffing of stainless steel, carbon steel and aluminum.

Unit edges are compactly folded upon themselves, making for a sturdy perimeter and a leading edge that improve the retention of buffing compound.

Instead of being fastened to a solid center, the units are held together by a special gripping steel ring. This leaves space around the shaft through which cool air circulates in all directions. The buff can run at high speeds without discoloring the work.

A buffing face wider than 12 in. can be built up. Mounting takes little time. *Write*: American Buff Co., 2414 S. La Salle St., Chicago 16, Ill. *Phone*: Calumet 5-1607

Solvent Detergent

No. 117 is a clear solvent that removes grease, oil and smut from machinery where water cannot be used. It cleans electrical equipment, diesel cabs and engine compartments.

Flash point of the solvent is 185°F (Cleveland open cup). The exposure tolerance rating is two and a half times greater than trichlorethylene and 20 times that of carbon tetrachloride.

The solvent is used full strength, and no rinse is needed. Parts can be blown dry with compressed air. *Write*: Oakite Products Inc., 134E Rector St., New York 6, N. Y. *Phone*: Whitehall 3-0940

Portable Marker

Machined, glazed or polished surfaces can be marked by the Airgrit. It leaves an etched impression on the surface of a part by blowing fine abrasive grit through relieved portions of a rubber mask.

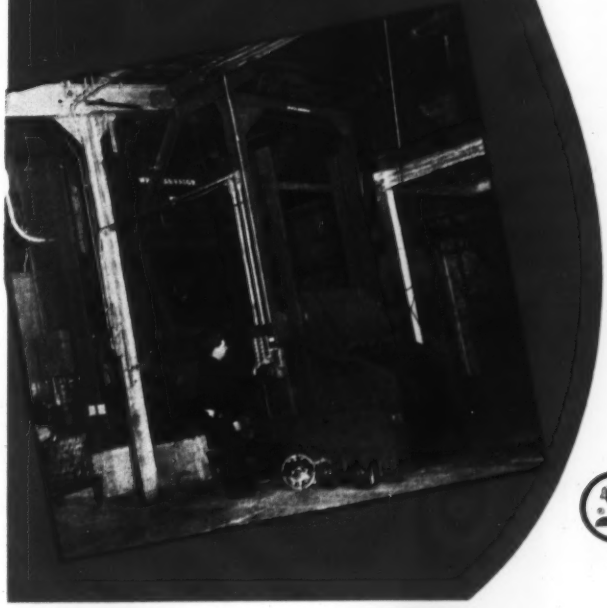
Delicate, precision and thin-walled parts can be marked with-

IN BATCH TYPE CLEANING THE

BIGGEST SAVINGS

ARE MADE WITH THE WHEELABRATOR

SUPER TUMBLAST



Even deep-cored work, like the parts shown here, are cleaned in just 12 minutes in the Super Tumblast.

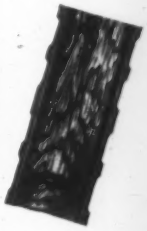
at Dayton Malleable Iron Co.

the WHEELABRATOR SUPER TUMBLAST

Cleaned 2827 tons of the toughest work as fast or faster than a 2-wheel machine and used *only* <u>one set of blades</u>

Saved 66.2% in Blade Costs
(Other Maintenance Costs Proportionately Low)

Saved 30% in Abrasive Consumption



The original blades lasted 696 hours, cleaned 2,827 tons of castings, at a cost of only 2.2c per wheel hour.

The tremendous savings promised for the Wheelabrator SUPER TUMBLAST are being delivered in actual performance. At the Ironton Division of Dayton Malleable Iron Company, for example, maintenance savings have been outstanding . . . the maintenance foreman says: "this machine is designed for the maintenance man."

The new Super-efficient Abrasive Separator is perhaps the greatest single cost-saving feature of the Super Tumblast because it affects so many areas. Having 3 times the air separation area of the conventional separator, it provides more effective and uniform removal of all abrading contaminants from the abrasive system without removing usable abrasives. It assures that super-clean abrasive is fed to the wheel at all times.

The Wheel itself is a new development of tremendous importance to cleaning economy because it throws more than twice as much abrasive as any similar sized wheel previously used. The wheel has new blades for longer wear, a strain-free blade holding device, a new easy-service guard housing, a new system of wheel guard liners . . . all designed to minimize maintenance.

Among the many other cost-reducing features designed into the Super Tumblast are the Super-Tight Cleaning Chamber that prevents jamming of the work, the Super-Sealed Door which prevents abrasive loss, and the use of Wheelabrator Long-Lyfe Parts at all high-wear points.

The Wheelabrator Super Tumblast will save YOU money . . . let us show you how. In the meantime, write for illustrated Brochure No. 125-D.

WHEELABRATOR

CORPORATION

509 S. BYRKIT STREET MISHAWAKA, INDIANA

MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN

CUT COSTS!

Make your plant more automatic and more productive

Send for Catalog #83 for information on MICRO SWITCH "Industrial Enclosed Switches"

• For years plant operating men have been putting new life into old machines—at low cost—by installing MICRO SWITCH precision switches to make them more automatic and more productive.

They do so by using MICRO SWITCH switches as limits, interlocks and safeties on almost every conceivable type of plant equipment. Special switches are available for use in explosive atmospheres or other hazardous locations. A wide variety of circuit arrangements, actuators and enclosures meets specific operating requirements.

Plant superintendents, electricians and maintenance men have found MICRO SWITCH products invaluable in making present equipment more productive. Full stocks of switches are readily available from authorized distributors who are as close as your telephone. Look under "Switches, Electric" in the Yellow Pages.

ANY OF THESE CATALOGS WILL BE SENT ON REQUEST

62a • "Basic Switches"	82 • "Basic and Enclosed Switches"
73b • "Toggle Switches"	83a • "Industrial Enclosed Switches"
74b • "V3 Switches"	90a • "Mercury Switches"
75a • "Subminiature Switches"	101b • "Switches for Industry"

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • **FREEPORT, ILLINOIS**

HOW SWITCHES HAVE BEEN USED TO SAVE TIME AND MATERIALS

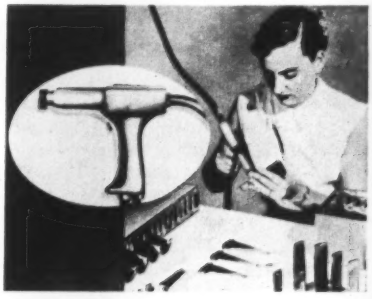
Stops needle breakage:
Switch stops knitting machine when slack develops in wire. Mechanism starts automatically when slack is relieved.

Protects personnel:
Explosion-proof switch installed on filter system permits operation of equipment only if vent valve is closed.

Prevents conveyor pile-up:
Two switches wired in series, each operating independently as sugar bag passes. When bags pile up, both switches are operated and conveyor stops.

Counts revolutions of mixer:
Switch connected with counting device is actuated by each complete revolution of mixing drum, recording number of revolutions at convenient point for operator.

NEW PRODUCTS and equipment

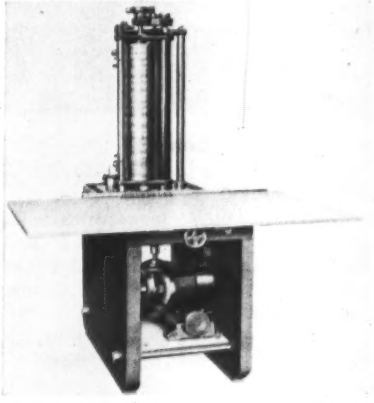


out danger of fracture or distortion. Markings can be changed in a few seconds. *Write*: Jas. H. Matthews & Co. Inc., 3978 Forbes St., Pittsburgh 13, Pa. *Phone*: Museum 1-8500

Graining Machine

Model V-27 is a vertical machine for printing a wood grain on steel, plastic or wood.

It will print molding 2 in. high, cabinets up to 40 in. high, at speeds



of 12 to 36 ft a minute. Table size is 34 x 54 in. *Write*: Hamant Tool Co., 3919 E. Second St., Dayton, O. *Phone*: Madison 1352

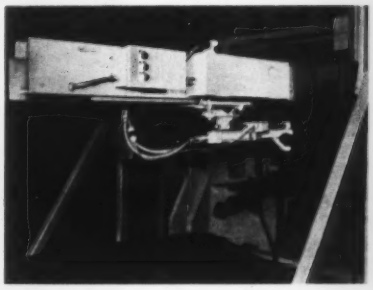
Press Unloader

This straight line unit is adaptable to all types of metal forming and forging presses.

It needs no guards, provides for easy die setting, does not interfere with crane chains and will unload draw dies on the binder angle.

Speed, stroke and dimensional adjustments can be made from floor level.

Four models provide strokes



from 12 to 48 in. *Write*: Press Automation Systems Inc., 18616 Wyoming Ave., Detroit 21, Mich. *Phone*: University 4-2018

Side Shifter

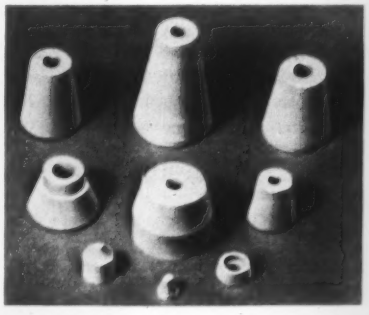
This attachment is available for a complete line of industrial trucks.

A double acting hydraulic cylinder provides 4 in. of travel on either side of the center position. Bronze wear plates give a full length bearing surface, yet add only a fraction of an inch to length. *Write*: Lamson Mobilift Corp., Syracuse 1, N. Y. *Phone*: 73-0221

Deburring

AlSiMag 491 ceramic shapes deburr machined or stamped metal parts quickly. The ceramic does not load up with metal and operates at high speeds.

The ceramic deburrs aluminum efficiently and produces a keen

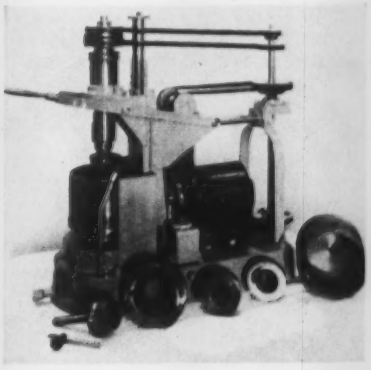


edge on carbide tools.

It is made in shapes for deburring or sharpening. *Write*: Steatite Division, American Lava Corp., Cherokee Blvd. & Manufacturers Rd., Chattanooga 5, Tenn. *Phone*: 5-3411

Roughing Machine

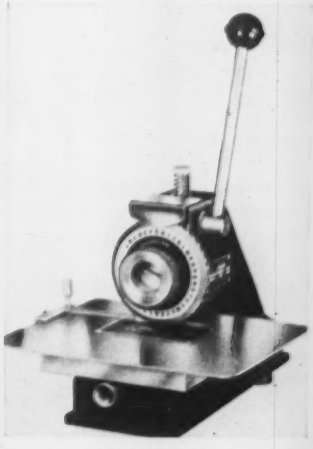
This machine can finish wire dies up to 3-in. in ID. Its worktable, which holds the die, moves counterclockwise to the movement



of the lapping pin. *Write*: Dykrex Corp. of America, P. O. Box 9022, Northeast Station, Newark 4, N. J.

Name Plate Press

Individual letters and numbers can be stamped on all types of identification plates and tags with this compact machine.



It also handles keys, tool room tags, inventory tags, nameplate badges for personnel, etc. *Write*: Clearview Co., 172 Stanton St., New York 2, N. Y. *Phone*: Oregon 3-0758

NEW literature

Write directly to the company for a copy

Excavator

The unit described in this 8-page bulletin has a dipper capacity of ¾-cu yd. Koehring Co., Milwaukee 16, Wis.

Flexible Mounting

Bulletin 901, 4 pages, is a guide which helps you to select flexible mounting systems for equipment requiring noise and vibration control. Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.

CO_2 Process

Release agents, core pastes, mudding compounds, collapsibility additives, binders and coatings for the CO_2 process are presented in bulletin FP-130, 4 pages. Frederic B. Stevens Inc., 1800 18th St., Detroit 16, Mich.

Precision Bearings

A 128-page catalog, 52-A, presents a line of precision bearings and gives data for determining forces that act on bearings and gears. Bearing Division, McGill Mfg. Co. Inc., Valparaiso, Ind.

Solder and Flux

A liquid rosin flux for soldering electronic and printed circuits is described in bulletin 2, 2 pages. Bulletin 3, 2 pages, covers silver bearing soft solders. Alpha Metals Inc., 56 Water St., Jersey City, N. J.

Walkie Trucks

An 8-page bulletin presents a line of electric powered walkie trucks. Moto-Truc Co., 1959 E. 59th St., Cleveland 3, O.

Surface Plate Calibration

A bulletin gives step-by-step instructions for calibrating surface plates after they are installed in the user's plant. Collins Microflat Co., 2326 E. Eighth St., Los Angeles 21, Calif.

Furnaces

Tool hardening or preheat furnaces are described in bulletin 461, 12 pages. A 4-page bulletin, 463, presents pusher furnaces which have a top temperature of 2400°F. Atmosphere equipment is presented in bulletin 256, 4 pages. C. I. Hayes Inc., 800 Wellington Ave., Cranston 10, R. I.

Toolholders and Inserts

Bulletin 852C, 8 pages, lists a line of toolholders plus triangular and square throwaway carbide inserts. Besly-Welles Corp., 852 Dearborn Ave., South Beloit, Ill.

Metal Cleaning

An 8-page bulletin discusses metal cleaning uses of sodium orthosilicate and gives its properties. Chlor-Alkali Sales, Dow Chemical Co., Midland, Mich.

Meters and Controls

Bulletin G15-1, 8 pages, describes more than 100 measuring, transmitting, receiving, recording and indicating instrument and control components for power and process applications. Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O.

Grinding Wheels

Advantages of the electronic formulation of grinding wheels are presented in an 8-page bulletin. Bay State Abrasive Products Co., Westboro, Mass.

Tooling

A case history, 32 pages, shows 14 types of work being produced on automatic dial feed multispindle machines. Bodine Corp., Bridgeport, Conn.

Fork Trucks

Here is a 20-page bulletin detailing the features of a new line of electric fork trucks. Department R-29, Lewis-Shepard Products Inc., Watertown, Mass.

Magnetic Control

Cypak magnetic controls and logic functions for industrial control are discussed in bulletin TD 52-760. Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Electronic Micrometers

Bulletin 4003, 4 pages, describes direct reading micrometers that measure thicknesses to 0.000020-in. J. W. Dice Co., Englewood, N. J.

Grinding Wheels

Bulletin GP-56 covers new developments in wheels for centerless, surface, internal and cylindrical grinding. Electro Refractories & Abrasives Corp., 344 Delaware Ave., Buffalo 2, N. Y.

Wet Blasting

A series of bulletins describes the uses of the pressure wet blasting process. Cro-Plate Co. Inc., 747 Windsor St., Hartford, Conn.

Rust Prevention

Data sheet 2-459 describes a rust preventive base which can be mixed with water, solvent or oil or used at full strength. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Gas Producers

Endothermic producers of protective atmosphere gases for heat treating are covered in bulletin GEC-1391, 4 pages. General Electric Co., Schenectady 5, N. Y.

Large Nuts

A 36-page catalog describes manufacturing processes and lists specifications of large hex, square and special nuts. Size range: 1¾ to 8 in. Department P, Jos. Dyson & Sons Inc., 5125 St. Clair Ave., Cleveland 3, O.

Gravity Conveyors

Wheel and roller type gravity conveyors are presented in bulletin 801, 8 pages. Conveyor Department, A. B. Farquhar Division, Oliver Corp., N. Duke St., York, Pa.

Socket Screws

Bulletin 723, 6 pages, tells why you should use the multiple-spline method of power transmission in socket screws. Socket Screw Division, Bristol Co., Waterbury 20, Conn.

Cupola Dust Control

Bulletin 292, 4 pages, describes a dry centrifugal dust separation system which exhausts large volumes of granular dust from cupolas and boiler stacks. American Air Filter Co. Inc., 215 Central Ave., Louisville 8, Ky.

Patterned Metal

A 6-page bulletin lists uses of a patterned metal which transfers heat and cold with high efficiency. Metals Division, Olin Mathieson Chemical Corp., East Alton, Ill.

Refractory Cement

A heavy duty, brick bonding and patching mortar (its maximum service temperature 3000°F) is described in an 8-page bulletin. Refractory & Insulation Corp., 120 Wall St., New York, 5, N. Y.

Flammable Liquids

An 8-page bulletin describes the nature and safe use of flammable liquids in plant operations. Technical Services Publications, Protectoseal Co., 1920 S. Western Ave., Chicago 8, Ill.

BLAW-KNOX makes what it takes

for continuous, mechanical chipping

The Continental Chipper with auxiliary equipment is a complete mechanical system for sorting, handling, inspecting and chipping billets. This integrated system has demonstrated in-service cost savings over manual conditioning. It represents a wise investment in long range modernization programs for conditioning for subsequent rolling in merchant and bar mill operations.

Product quality improvement is immediate, positive. Precise chipping is accomplished by a non-traveling cutter head under which the billet moves in a fashion similar to a milling machine. All chipping is done at close range, immediately in front of the operator. This single operator, located in front of the cutter head controls the entire operation including all material handling.

The chipper is equipped with special interlocking devices which eliminate unsafe operation. Usual chipping bay hazards such as high pressure air lines, improperly handled chisels, and flying chips are removed. The Continental Chipper accommodates billets up to 30 feet in all merchant and bar mill sizes.

For complete details, write for illustrated booklet.

50th Anniversary
BLAW-KNOX
1906-1956

BLAW-KNOX COMPANY
Foundry and Mill Machinery Division
Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania

JONES & LAUGHLIN INTRODUCES

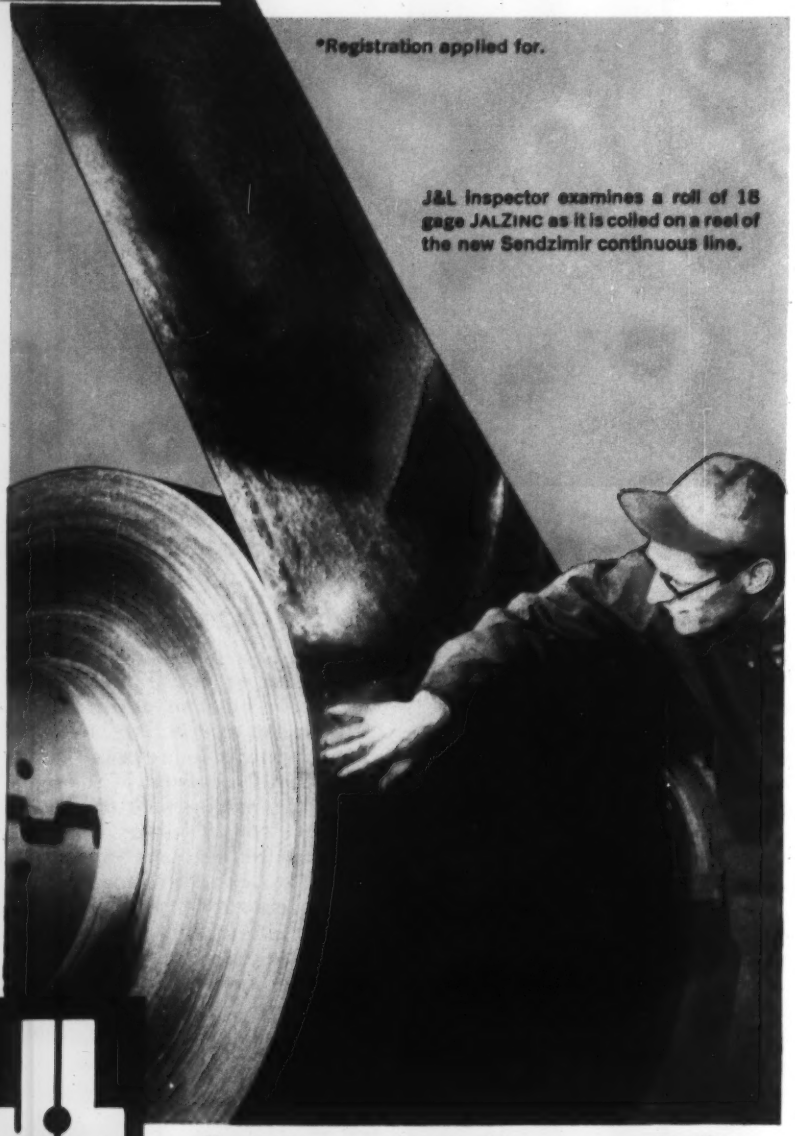
JALZINC*

*Registration applied for.

JALZINC is Jones & Laughlin's new trade name for its *high quality* zinc coated steel sheet and coiled product. JALZINC answers your toughest forming, rolling and drawing problems.

Produced by the proven Sendzimir process, JALZINC has a tight, uniform coating that resists cracking and flaking. The high lustre finish greatly improves the appearance of your end product. JALZINC is available in a wide range of gages and widths in both cut lengths and coils.

Users are enthusiastic about JALZINC'S uniform ductility, flatness and surface finish. Write today for complete details.



J&L inspector examines a roll of 18 gage JALZINC as it is coiled on a reel of the new Sendzimir continuous line.

Jones & Laughlin Steel Corporation
Dept. 404, 3 Gateway Center
Pittsburgh 30, Pa.

☐ Please send literature on JALZINC
☐ Please have J&L representative call

Name_____

Position_____

Company_____

Address_____

City_____ Zone_____

State_____

J&L STEEL

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH

STEEL

September 24, 1956

Market Outlook

AFTER several months of absence from the steel market, auto plants are beginning to make their steel wants known.

Those which have contacted one major steel producer have asked for 70 per cent of the tonnage allotted to them for November delivery.

OUTLOOK—By the deadline for placing November orders, the percentage may go above 70. The December take should be even larger. By then, the automotive industry will have reduced further the stocks it laid in as protection against the steelworkers' strike and the increase in steel prices. Also, it will have a better idea of the flow of steel to it from the mills, and the public acceptance of the 1957 autos. Passenger car production in the fourth quarter is expected to be around 1.7 million or 1.8 million units—the best quarter of this year.

CONTRASTS—Cold-rolled carbon steel sheets (the auto industry is the largest user) are fairly easy to get. Products which are hard to obtain are those which were in that position before the steelworkers' strike. They include: Structural shapes, plates, seamless tubular goods and hot-rolled carbon sheets.

The heavy demand for structurals and plates has extended deliveries of fabricated steel for bridges so far into 1958 that planners are turning more and more to prestressed concrete girders and spans. This is a boon to wire producers. Their product is used to reinforce the concrete.

LINING UP—The strong demand for seamless tubing is prompting utility companies to try to cover early on their 1957 requirements. Demand for oil country tubular goods and line pipe exceeds supply by a wide margin.

The heavy and hot-rolled products are in stronger demand than the light and cold-finished forms of steel. It's a result of strong activity in heavy construction, such as industrial, commercial and institutional buildings, roads and bridges, railroad freight cars and machinery.

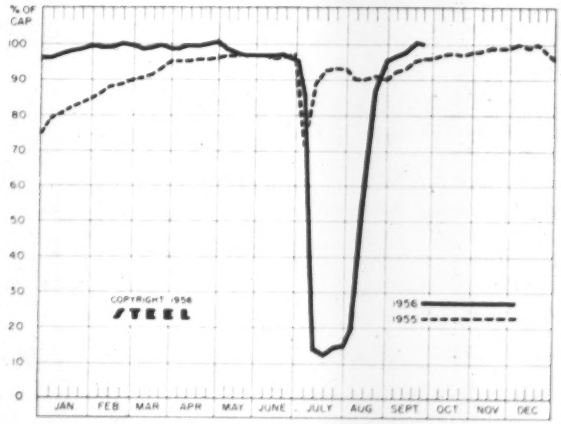
AT CAPACITY—Except for structurals, plates, seamless tubular goods and hot-rolled sheets, customers are not beating at steel company doors for deliveries. Yet demand over-all is strong enough to keep mills turning out steel ingots at 100 per cent of capacity. That rate for the week ended Sept. 23 represents a minor fluctuation of half a point downward. Several districts were above the national average. Buffalo was at 107.5 per cent, Cleveland at 105.5.

EXPANDING—Growth in steel consumption and capacity is stimulating steel warehouses and distributors to think about expanding. One warehouseman says: "We'll have to step up expansions if we expect to keep pace with the mills and maintain our sales ratio of 20 per cent of all finished steel. We've been increasing space 7 to 8 per cent annually, and it hasn't been enough." Expansion would include setting up operations in new areas.

PRICE TRENDS—Steel prices are holding steady at the higher levels to which they ascended after the steelworkers' strike, but costs of raw materials to the steelmakers continue upward.

STEEL's price composite on finished steel holds at $137.75 a net ton. Also unchanged is STEEL's price composite on steelmaking scrap. It's at the record level of $59.67 a gross ton.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Sept. 23	Change	Same 1955	Week 1954
Pittsburgh	99	+ 0.5*	99.5	67
Chicago	101.5	— 0.5*	97.5	69.5
Mid-Atlantic	98	0	93	58
Youngstown	102	3	100	51.5
Wheeling	97.5	— 1	96.5	86.5
Cleveland	105.5	— 1.5	100.5	80
Buffalo	107.5	0	105	61
Birmingham	95.5	0	95.5	75
New England	92	+ 2	88	49
Cincinnati	89	— 2	85	62
St. Louis	88	— 7.5*	92.5	69
Detroit	99	+ 1.5	95	70
Western	99	+ 2	94	81
National Rate	100	— 0.5	96	66.5

INGOT PRODUCTION‡

	Week Ended Sept. 23	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	152.6†	154.2	146.9	144.4
NET TONS (In thousands)	2,452†	2,477	2,359	2,320

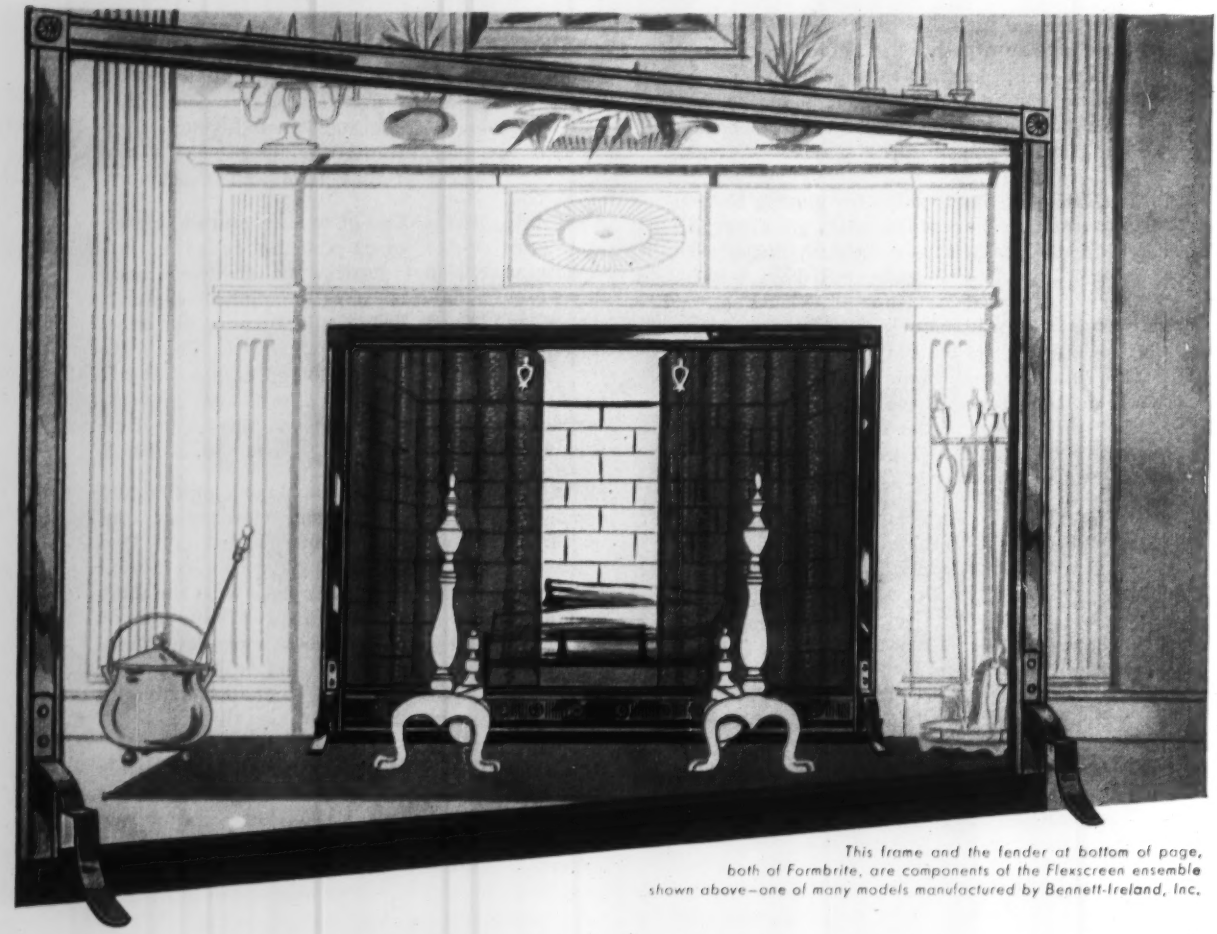
*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954.

Metalworking Outlook—p. 59

Technical Outlook—p. 115

Formbrite cuts polishing cost 50% for Flexscreen®

Bennett-Ireland, Inc., drops cutting operation completely, speeds buffing—finds Formbrite also gives a more attractive, scratch-resistant finish.



This frame and the fender at bottom of page, both of Formbrite, are components of the Flexscreen ensemble shown above—one of many models manufactured by Bennett-Ireland, Inc.

Bennett-Ireland, Inc., Norwich, N.Y., previously used ordinary drawing brass for hearth fenders, kerbs, and frames in their famous flexible-metal fireplace screen ensembles. In polishing, the production rate was 12 frames per hour for the cutting operation and 4.5 frames per hour in the buffing operation.

When Bennett-Ireland changed to Formbrite*, they found they could drop the cutting operation completely. And Formbrite's superior fine-grain finish speeded the buffing rate to 6.8 frames per hour. Thus the unit polishing costs for the frames were cut 50 per cent.

Bennett-Ireland also found that Formbrite forms readily with no rejections and that it resists scratching during forming and handling. The end result is a product with superior eye-appeal that will remain beautiful in the home through the years.

See for yourself: Formbrite is a premium product at a nonpremium price. Find out for yourself how its superfine grain, excellent drawing properties, strength, and scratch resistance can help you make a better product at lower cost. Write for Publication B-39. Better still, ask about a sample or a trial batch. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

5665

*Reg. U.S. Pat. Off.

Formbrite

SUPERFINE-GRAIN DRAWING BRASS

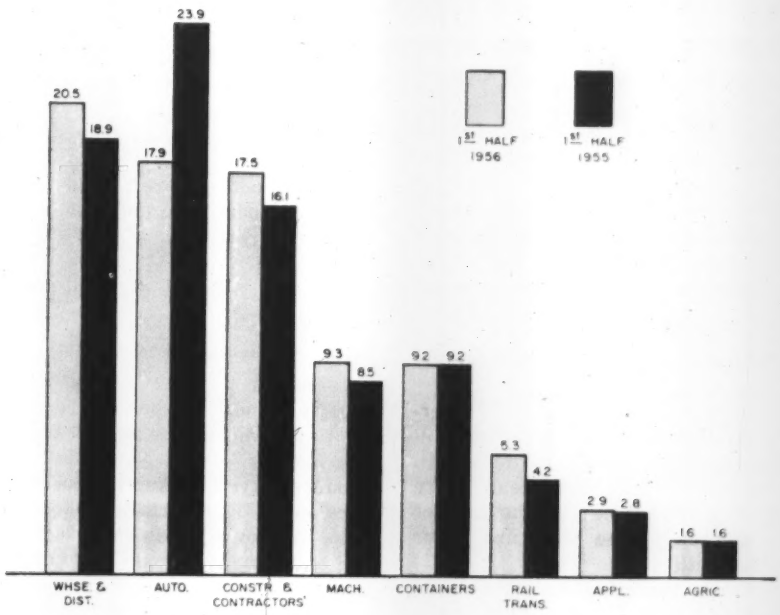
an ANACONDA® product

made by

The American Brass Company

Trends in Steel Distribution

(Per cent of domestic shipments)



Source: American Iron & Steel Institute

Steel Markets Shift

Warehouses take lead from auto makers as chief mill customers. Switch is result of slow year for passenger car assemblies. Railroad buying is up significantly

WAREHOUSES and distributors are heading for No. 1 position among steel mill customers for the third time in the last five years. On the basis of first half figures, they will take a record tonnage this year and may account for the highest percentage of mill shipments in the history of the industry (see chart).

For several years, warehouses have alternated with the auto industry as the top steel taker. Indications so far in the second half are that the switch in last year's pattern will come off on schedule. Some of the 8 million tons the auto makers received in the first half are still in inventory and are putting a damper on their normal fall rush for steel. The mills may be pushed to fill Detroit's orders in November and December, but the tonnage will not be enough to push automotive ahead of warehouses, which took 9.2 million tons in the first half. Mill shipments in the first half of this year totaled 46,933,786 tons, compared with 41,990,159 tons in first half, 1955.

Part of this shift in pattern is due to the relatively off year posted by motordom. If 1956 had panned out as predicted earlier in the year, there wouldn't have been as much steel shipped to warehouses and the percentage would have been similar to last year's. In all of 1955, auto makers got about 22 per cent of the steel while warehouses got only 18.4 per cent.

Show—In third place (as usual) was construction (including maintenance) and contractors' products. The large increase in this category reflects the strength of heavy construction and roadbuilding. Fourth place was a close race between machinery (including electrical) and containers, with machinery winning by a nose. Machinery has been one of the most consistent performers on the industrial scene all year.

Surprises — Among the smaller users of steel products, the increase in railroad buying is no surprise in view of the increased activity in carbuilding this year. But appliance tonnage increased from 1,115,072 tons in last year's first half to 1,299,855 tons in the corresponding period this year despite a lag in sales since early spring. Just as surprising are the figures for the agricultural category. While the percentage remained unchanged, the tonnage was up from 663,041 last year to 698,450 this year.

Stainless Steel . . .

Stainless Steel Prices, Page 163

Sales to aircraft companies are strong. Producers expect an early upturn in demand for high heat-resistant stainless steel for jet aircraft. The third quarter has been dull, some consumers permitting their inventories to decline. Orders for fourth quarter delivery are increasing.

Warehouse . . .

Warehouse Prices, Page 164

Inventories held by distributors are in as bad shape as they've been in years, complains the president of one large Midwest warehouse. Structurals and plates are nearly nil; cold and hot-rolled sheets, while in fair supply, are getting tighter by the week. The one big exception is cold-finished bars. Stocks are so ample salesmen are being pressured to "get out and move the stuff."

Distributors think such products as bars and mechanical tubing will be in freer supply in late fourth quarter, following reduced offerings of October. This is based on the possibility that the automotive industry may not take all the steel that has been set aside for it.

New York area warehouses say order volume is slightly heavier this month than it was last month. Over-all sales are retarded by in-

adequate inventories of structurals and plates. Sheets, carbon bars and alloy product stocks, although reduced by smaller intake in July-August, are not seriously depleted. Galvanized steel stocks are described as heavy.

Stainless steel orders are brisk, and except for nonnickel 430 grade, stock replacement presents a problem for the distributors.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 159

Concrete reinforcing steel inventories are in fair balance with demand in the Chicago area. Sales this year are substantially ahead of those in the like period last year, and the outlook continues promising.

Recent awards for construction include two for the Calumet Skyway (2064 tons). Bids will be opened Oct. 4 for work on the Illinois toll road, McHenry county, section N4A, involving 180 tons.

About 500 tons of reinforcing bars in small lots were placed with Pacific Northwest rolling mills last week. Considerable tonnage, including highway work in Washington and Oregon, will be placed within 30 days. J. T. Ryerson & Son Inc., Reinforcing Division, reports a good volume in small contracts.

Steel Bars . . .

Bar Prices, Page 159

Hot-rolled carbon bar schedules for the fourth quarter are filling. About half of normal tonnage is available for new orders over and above carry-overs from the third quarter. All producers of hot-rolled trimmed their offerings for the period, but the tonnage may be increased later if auto orders do not materialize in the volume expected.

Relatively light auto demand had been encountered to date. Orders are mostly for new sizes, grades and specifications needed for model changes. Heavy auto requirements are thought certain to come out shortly.

Cold-finished bars are not in as tight supply as hot-rolled. In the common grades, volume may not be excessive for fourth quarter in view of substantial inventories held by some users. One large producer says there may be a little extra tonnage available even though strong automotive demand develops.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 160 & 161

Auto builders' orders for hot and cold-rolled sheets reflect the low volume of car production in the model-change period. This prime consuming industry hasn't entered fourth quarter orders with the sheet mills in expected volume.

Sheetmakers think auto demand will "break" in the next couple weeks. When this happens, they feel the market will definitely tighten up.

Appliance makers are not ordering hot and cold-rolled sheets in the usual volume for the fourth quarter. This may mean more tonnage available for the market even though auto needs are larger than anticipated.

While the mills wait for large volume auto orders, they have some open space in cold-rolled sheet schedules for December. Hot-rolled sheets are virtually sold out for the entire fourth quarter at Pittsburgh, and openings at other producing points are narrowing.

Hot-rolled strip and galvanized sheets are in relatively easy supply. Low carbon strip users can buy for November shipment, and demand is reported only slightly improved. Galvanized sheet sales are usually slow in the fourth quarter. To some extent, current hot-rolled sheet volume is bolstered by demand from slitters.

Plates . . .

Plate Prices, Page 159

Most eastern plate mills do not have open more than one month's production — December — for new fourth quarter bookings. Some sellers may not have even that much tonnage available, especially in the wider and heavier sizes.

Delivery promises for half quotas for the fourth quarter will be delayed. Some fabricators expect December tonnage to be delivered to them in January, with most of them on a 50 per cent allotment in November and December. Some producers are running a month and a half to two months behind delivery promises.

Weldment and other plate fabricating shops are hampered in maintaining schedules, notably those that operated during the steel strike in July. They depleted their inventories and are not back to the prestrike supply level.

Accumulated defense tonnage, mostly specialties, is a factor in making up fourth quarter order books.

Some producers are rolling light plates on sheet-strip mills, but this is at the expense of hot-rolled sheets.

Wire . . .

Wire Prices, Page 161 & 162

Increased demand for a wide variety of wire products is reported. In the Midwest, merchant items are moving better. At Buffalo, a producer says a pickup in specialty wire needs is especially welcome. Some improvement in manufacturers wire requirements is noted, chiefly on automotive account. Auto business is expected to pick up during the fourth quarter.

Heading wire buying by New England consumers is slightly more active, but is confined mostly to filling breaks in inventories. More heading wire is being bought to specification for direct working. Spring wire orders follow this pattern, mostly to bring up inventories.

Orders for reinforcing and prestressing are heavier.

The automotive industry is placing November shipment orders for valve spring wire. Demand for mechanical spring wire also is improved. Some eastern producers are trying to build up music wire inventories without overtime costs. Low carbon wire and heading grade bookings extend well into November.

Tubular Goods . . .

Tubular Goods Prices, Page 163

Producers of line pipe and casing are flooded with orders. It's difficult to obtain delivery promise on a major trunk line project before 1959. Oil country tubemakers say their customers allowed stocks to decline during the steel strike. Current low inventories of buyers are putting pressure on the mills for quicker deliveries.

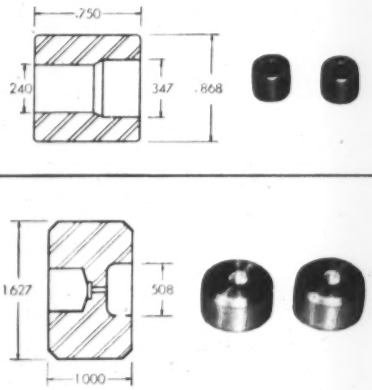
Merchant pipe mills are generally

Finish turning operation on a hi-speed steel heading die, using a Monarch 13" Series 61 Air-Gage Tracer Lathe, .015" stock is removed within a limit of ±.0005". Turning time is 15 minutes compared to 2 hours previously required on a conventional engine lathe.

WITHOUT MONARCH–TIME'S A-WASTING!

Air-Gage Tracer Lathes Cut Contouring Time from 2 Hours to 15 Minutes — ±.0005"!

Group of typical heading dies which are finish bored on the 10" Model EE Air-Gage Tracer machines. Drawings show complexity of work. Under the same conditions as above, the same time savings are realized.



Can you ignore savings like these reported by Standard Pressed Steel Company?

They use a battery of Monarch Air-Gage Tracer lathes in their production toolroom for finishing operations on small forging dies. Most of the work is contour boring to exceptionally close limits plus quite a variety of contour turning.

The machines go sixteen hours per day, six days per week. Monarchs were chosen because of Standard Pressed Steel's previous satisfaction with this make of lathe. The Monarch flame hardened, precision ground bed ways are considered a must in this plant. These tracer controlled lathes are much faster and more accurate than the conventional engine lathes previously used and more uniform in performance.

Now, check over the job reports in the picture captions. Two hours cut to fifteen minutes! You're right — you can't ignore savings like these! Write now for our Booklet # 2608... **The Monarch Machine Tool Company, Sidney, Ohio.**

Monarch
TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE

FOR A BETTER TURN FASTER . . . TURN TO MONARCH

solidly booked for November production, with a flow of orders being received for December shipment. Some jobbers, whose stocks are noticeably depleted, are already putting in requests for January tonnage.

Having run short of pipe this year, New England public utilities are trying to cover their 1957 seamless pipe requirements earlier. Distributors' stocks of seamless are low, and buttweld pipe deliveries are more extended. Some mills are entering no new tonnage for October.

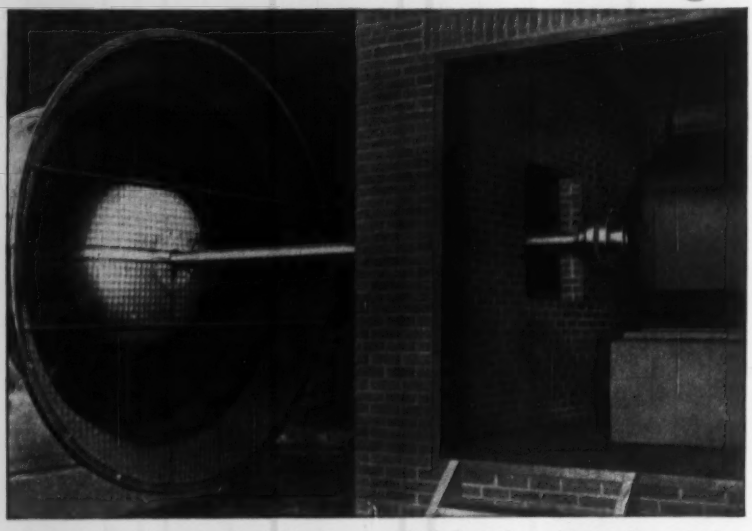
On mechanical and pressure tubing, backlogs are being rescheduled for production with about one month lost.

Rails, Cars . . .

Track Material Prices, Page 162

Operations have been resumed at the Bessemer, Ala., plant of the Pullman-Standard Car Mfg. Co. after a suspension of two months. Because of the long strike at the works of U. S. Steel's Tennessee Coal & Iron Division, the plant could not get steel.

Eliminate Intermediate Bearings!



By using Thomas Flexible Couplings on long, unsupported shafts, intermediate bearings are eliminated. Thomas engineers tubular shafts free from lateral whip.

The large fan shown above is 16' from the motor to allow sufficient air intake. Miners working underground receive their fresh air supply from this fan and others like it, which have been giving dependable service for as long as fifteen years . . . without shutdowns for lubrication or maintenance of the couplings.

Thomas floating shaft flexible couplings are recommended for machine and marine drives, printing presses, paper and cement mills, cooling towers, diesel engines, pumps, compressors, and many other uses.

Only Thomas Flexible Couplings offer *all* these advantages
UNDER LOAD and MISALIGNMENT

1. Freedom from Backlash—Torsional Rigidity
2. Free End Float
3. Smooth Continuous Drive with Constant Rotational Velocity
4. Visual Inspection in Operation
5. Original Balance for Life

. . . *and*

THOMAS ALL METAL COUPLINGS HAVE NO WEARING PARTS SO LUBRICATION AND MAINTENANCE ARE ELIMINATED

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

Structural Shapes . . .

Structural Shape Prices, Page 159

Inquiries for fabricated structural steel are attracting fewer estimates. More tonnage is being placed on the basis of delivery, and with some shops booked into 1958, contracts are going to those promising earliest shipment.

Shipments of plain material are slightly heavier, but tonnage is against prestrike orders, some deliveries having been originally scheduled for July. For new fourth quarter bookings, less than six weeks production is open. Demand is far in excess of supply. Wide flange beam shipments extend well into next year. One eastern shop can give around ten months delivery on welded plate girders.

Extended bridge steel deliveries (well into 1958 on larger tonnage projects) are stimulating designs for prestressed concrete girders and spans. Five structures in the greater Hartford, Conn., area would take 35,000 tons of structural steel; one span (13,000 tons) over the Connecticut river has been placed, but at least one other bridge, 1680 ft, will be built with fourteen 120-ft prestressed girders and deck, Windsor, Conn. Prestressed girders can be delivered under one year with a price advantage of $35-$40 a ton.

Interest is reported rising in several projects in the New York area.

A Chicago area fabricator's backlogs have jumped from eight to ten months since the strike. No relief is in sight until next spring, if then. During the strike, this shop trimmed its work force substantially and doesn't expect to call back men until yearend.

Pig Iron . . . .

Pig Iron Prices, Page 164

Merchant iron demand is holding on a fairly even keel. Foundries are buying for nearby needs, generally within a 30-day period. There is little incentive to buy ahead.

Production appears adequate for current demand. Iron is available for export.

Suppliers are optimistic about fourth quarter business. They expect an increase in buying by foundries serving the automotive industry.

Mystic Iron Works Division,

Eastern Gas & Fuel Associates, Everett, Mass., is quoting unchanged prices for the fourth quarter to contract customers. The price continues $63.75 for No. 2 foundry iron, Everett furnace.

Ferroalloys . . .

Ferroalloy Prices, Page 166

Prices on a number of ferroalloys have been advanced by Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York. They reflect increased costs of labor, freight, ore, scrap and other raw materials. The prices became effective Sept. 14 but do not apply on shipments to contract users until Oct. 1. The weighted average of the increases is 5.16 per cent.

Increases include: Regular high-carbon ferrochrome, up 1.5 cents per pound of contained chromium; medium-carbon ferrochrome, up 3 cents; low-carbon ferrochrome in all grades, including Simplex ferrochrome, up 2.25 cents; chromium metal, both regular and electrolytic grades, up 4 cents; ferrosilicon-chrome and exothermic silicon-chrome, up 2 cents; ferrochrome-silicon, 2.3 cents; SM ferrochrome and both grades of exothermic ferrochrome, 1.5 cents.

Among the manganese alloys, standard ferromanganese, including the low-phosphorous grade, is increased 1 cent a pound of alloy; silicomanganese in all grades, 0.95 cent; electrolytic manganese metal, 1.8 cents; and Mansiloy alloy, 1.35 cents. All grades of medium-carbon ferromanganese go up 1.3 cents; low-iron ferromanganese and all grades of low-carbon ferromanganese go up 1.8 cents.

The increase in the regular grade of 50 per cent ferrosilicon is ¾-cent per pound of contained silicon and ferroaluminum-silicon; all grades of 65 per cent ferrosilicon are raised a like amount. The low-aluminum grade of 50 per cent ferrosilicon is advanced 1 cent.

Among the iron alloys, silicon briquets are increased 4/10-cent; silicomanganese briquets, 0.85 cent; chromium briquets, 2.05 cents; ferromanganese briquets, 9/10-cent; and zirconium briquets, 2 cents. SMZ alloy is up ½-cent a pound; foundry ferrosilicon-chrome, 1.05 cents a pound; and foundry ferrochrome, 1.5 cents a pound of contained chromium.

Among the special alloys, calcium-silicon, calcium-manganese-silicon and 35/40-per cent zirconium alloy are increased 1 cent a pound of alloy; 12/15-per cent zirconium alloy, ¾-cent a pound. Vanadium oxide, both fused and red cake, is increased 5 cents per pound of V_2O_5; all grades of ferrovanadium, 10 cents a pound of contained vanadium. Silicon-titanium is up 45 cents a pound of contained titanium, and ferrotantalum-columbium is advanced 30 cents.

Low-chromium high-carbon ferrochrome and charge chrome, two of the new addition agents for adding chromium to stainless steel with the charge, are increased 1.5 cents a pound contained chromium.

To cover the higher cost of packing and sizing, all packing differentials for products sold both bulk and packed are increased $4 per net ton of material. Charges for palletized shipments and for smaller - than - standard packages are unchanged. All sizing differentials on material 2 in. by down and smaller, are advanced $2 per net ton of material.

NOTICE
to users of spindles* that need repair or rebuilding

POPE — the leading builder of precision spindles IS THE BEST PLACE TO HAVE YOUR SPINDLES MADE GOOD AS NEW.

Today's grinding, milling and boring tolerances demand precision spindle performance.

Pope puts your spindles in shape *quickly*, at lowest cost. (Cost figures are promptly submitted for your approval before the work is done.)

The same expert craftsmen that build Pope Precision Spindles will assemble, preload and lubricate the proper bearings and dynamically balance. The job will be done *right* the first time.

Send Your Spindles for Repair to POPE

Spindles repaired and rebuilt by POPE are assembled in an electrically air cleaned, air conditioned room. They are dynamically balanced, as pictured, to the same tolerances as new spindles. This assures better surface finishes and smoother running spindles.

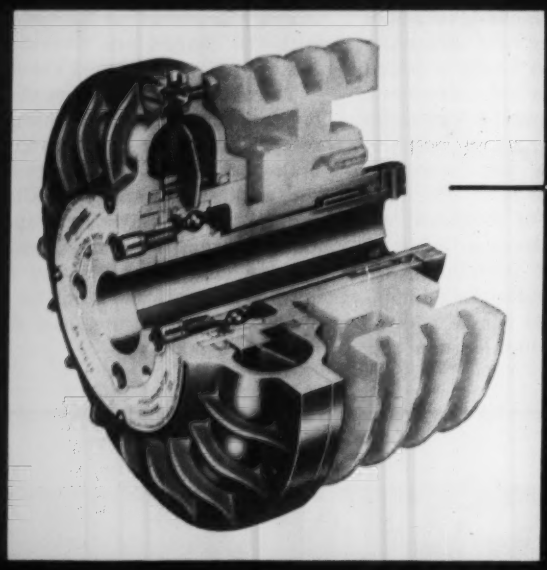
* POPE Repair and Rebuilding Service applies to ANY SIZE, ANY MAKE of Anti-Friction Bearing SPINDLES.
Belt Driven
Motorized
High Cycle

POPE MACHINERY CORPORATION
261 River St., Haverhill, Massachusetts

Mail me a copy of Bulletin R-1 describing in detail Pope Precision Spindle repair and rebuilding service:

Name.....
Company.....
Address.....
City.....Zone...State.....

No. 114



Great Performance!

– is the verdict from the field on

FLEXIDYNE

THE DRY FLUID DRIVE

Experience in the field proves that the new principle employed in Flexidyne provides a better way to handle difficult drive problems. Now delivered from stock, Flexidyne Drives and Couplings are used in a wide variety of applications. Already reports like these are coming in about Flexidyne performances in many tough assignments:

RAILROAD CAR PULLERS . . . *"Starts fine . . summer or winter!"*
CONVEYORS . . . *"We start under full load now!"*
COTTON CARDS . . . *"Finally . . the soft start!"*
TRAVELING CRANES . . . *"Spots our load . . and how!"*
PUMPS . . . *"Now we are using smaller motors, too!"*
VENTILATING FANS . . . *"Takes off smooth as silk!"*
. . . AND OTHER HEAVY INERTIA LOADS . . . *"Wonderful performance!"*

Call the Transmissioneer, your local Dodge Distributor, for details about Flexidyne. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write to

DODGE MANUFACTURING CORPORATION, 4400 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4000 tons, power plant extension, Connecticut Light & Power Co., Hartford, Conn., to Belmont Iron Works, Eddystone, Pa., through United Engineers & Constructors Inc., Philadelphia.

2400 tons, steel columns, poles, Philadelphia Electric Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

2200 tons, power plant extension, Virginia Electric Co., Portsmouth, Va., to Globe Iron Works; Stone & Webster Engineering Corp., Boston, contractor-engineer.

850 tons, shopping center, Latham's Corner, N. Y., to American Bridge Division, U. S. Steel Corp., Pittsburgh; B. Perini & Sons Inc., Framingham, Mass., general contractor.

550 tons, high school, Framingham, Mass., to Grand Iron Works, Bronx, New York, through B. Perini & Sons Inc., Framingham, general contractor.

275 tons, high school, Baldwinville, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.; Granger Construction Co., Worcester, Mass., general contractor; reinforcing bars to Joseph T. Ryerson & Son Inc., Boston.

110 tons, also 50 tons of reinforcing, Washington state highway bridge, Adams county, to unstated interest; C. E. Oneal, Ellensburg, general contractor, low at $328,495.

STRUCTURAL STEEL PENDING

4400 tons, lift span bridge over the Arthur Kill, Staten Island, for the Staten Island Rapid Transit Railway Co., a Baltimore & Ohio subsidiary, Karl Koch, New York, low on the contract for fabrication and erection; if the award is made, the fabrication will be sublet.

3400 tons, Division street bridge, Pawtucket, R. I.

950 tons, stoplogs, low alloy structural steel, double 83-ft trusses, Robins Bay and Grass River locks, St. Lawrence seaway project; bids about Nov. 6, Corps of Engineers.

2300 tons, bridge superstructure, Merrimack river, Metheun, Mass.

1000 tons, two-place hangar, Moses Lake Flight Center; bids to Boeing Airplane Co., Seattle, Sept. 27.

900 tons, aircraft nuclear engine laboratory, Middletown, Conn., Bethlehem Fabricators Inc., Bethlehem, Pa., low; bids direct to U. S. Corps of Engineers, Boston.

750 tons, Russell street bridge, Missoula, Mont.; bids to county commissioners, Sept. 24; bond issue of $275,000 authorized; general bids will be asked in November.

600 tons addition to Seattle city light building; bids soon.

600 tons, New York state bridgework, Prospect Park expressway, Brooklyn, N. Y., bids closed Sept. 13.

400 tons, Seattle city light substation; bids soon.

275 tons, reconstruction of Longfellow bridge, Cambridge, Mass.; also 750 tons of reinforcing bars.

200 tons, underpass, Memorial drive, Cambridge, Mass.

200 tons or more, addition to assembly and maintenance buildings, reactor testing station; J. H. Wise & Son Inc., Boise, low at $2,643,000 to Atomic Energy Commission, Idaho Falls, Idaho; also reinforcing required.

130 tons, power substation for Tacoma, Wash.; bids in.

165 tons, state bridges, Rochester, N. H.; also 280 tons of reinforcing bars.

185 tons, state highway bridge, Freeport, Me., also 135 tons, reinforcing bars.

145 tons, steel stringer bridge, Worcester, Mass.

160 tons, 3-span bridge over the Boston & Maine railroad, Greenfield, Mass.

120 tons, state highway bridge, Rochester, N. H.

110 tons, including reinforcing bars, Washington state underpass, Moses Lake; bids to Olympia, Wash., Sept. 11.

100 tons, Washington state railroad bridge, Grant county; Cherf Bros. & Sandkay Inc., Ephrata, Wash., low at $101,450.

REINFORCING BARS . . .

REINFORCING BARS PLACED

650 tons, central office building, State Highway Department, district 1, Wethersfield, Conn., to Scherer Steel Co., Hartford, Conn.; Felix Buzzi & Son, Torrington, Conn., general contractor.

430 tons, dormitory and classroom buildings, Fairfield University, Fairfield, Conn., to Igoe Bros. Inc., Newark, N. J., through E. & F. Construction Co., Bridgeport, Conn., general contractor.

270 tons, accounting building, New England Telephone & Telegraph Co., Salem, Mass., to Northern Steel Inc., Medford, Mass.; George A. Fuller Co., Boston, is general contractor.

220 tons, women's dormitory, Howard College, Birmingham, to Connors Steel Division, H. K. Porter Company Inc., through Brice Building Co. Inc., both Birmingham.

250 tons, Town House apartment, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle.

187 tons, Washington state, three I-beam bridges, King county, to Northwest Steel Rolling Mills Inc., Seattle; Erickson Paving Co., Bellevue, Wash., general contractor, low at $826,546.

178 tons, highway project, Thurston county, and University Presbyterian Church, Seattle, Jentoft & Forbes, Seattle, general contractor, to Soule Steel Co., Seattle.

170 tons, including 96 tons of steel piles, substructure, bridge, Connecticut river, Holyoke, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; E. T. O'Neill & Son Construction Co., Holyoke, Mass., general contractor.

155 tons, including structurals, school, Bedford, Mass., to Barker Steel Co., Watertown, Mass. (bars), and Brayton-Wilson-Cole Corp., Boston (structurals); Sewell Smith Construction Co., Framingham, Mass., general contractor.

150 tons, Washington state project, Douglas county, to Soule Steel Co., Seattle; general contract to Curtis Construction Co., Spokane, Wash.

100 tons, addition to Scott Paper Co. plant, Everett, Wash., and miscellaneous jobs, to Northwest Steel Rolling Mills, Inc., Seattle.

REINFORCING BARS PENDING

315 tons, ammunition storage igloos, Paine Air Field, Washington; general contract to Roy T. Earley Co., Tacoma, Wash.

780 tons, also steel piling, Aurora avenue underpass, Seattle; Butler Construction & Engineering Co., Seattle, is low at $1,759,705.

320 tons, also 18 tons shapes, Washington state girder railroad bridge; bids to Olympia, Wash., Sept. 25 (Thurston county).

300 tons, Seattle University addition; bids Sept. 25.

250 tons, Washington state Okanogan county bridge; bids to Olympia, Wash., Sept. 25.

200 tons, two Washington state highway spans, Thurston county; bids to Olympia, Wash., Sept. 25.

115 tons, also steel piling, Montana state, Dawson county highway bridge; bids to Helena, Mont., Sept. 27.

150 tons, Washington state highway bridges; bids to Olympia, Wash., Oct. 9.

145 tons bars and steel piles, two reinforced concrete bridges, Harmony-Evansburg, Pa.; bids Sept. 28, Harrisburg.

100 tons, also 70 tons of shapes, Yakima river bridge; general award to Everett McKellar, Chelan, Wash., low at $186,159 to Benton county commissioners.

80 tons, plus miscellaneous, two highway bridges, Lewis county, Wash.; bids to Bureau of Public Roads, Portland, Oreg., Sept. 21.

PLATES . . .

PLATES PLACED

150 tons, elevated water tank, Veterans Hospital, Sheridan, Wyo., to Chicago Bridge & Iron Co., Chicago.

PLATES PENDING

3800 tons, 2556 spherical floats, Navy Purchasing Office, Washington, Sept. 28, for Bayonne, N. J.

PIPE . . .

CAST IRON PIPE PENDING

350 tons, 16,000 ft of 12 and 8 in.; bids in to Everett, Wash.

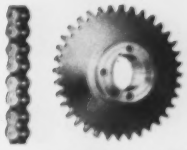
150 tons, 12 in.; bids in to Auburn, Wash.

150 tons, 8 in.; bids in to Chehalis, Wash.

DODGE PRODUCTS you should know

TAPER-LOCK
ALL STEEL
CONVEYOR PULLEYS

TAPER-LOCK
SHEAVES



TAPER-LOCK
SPROCKETS AND
DODGE ROLLER CHAIN

DODGE BULLETINS YOU SHOULD HAVE

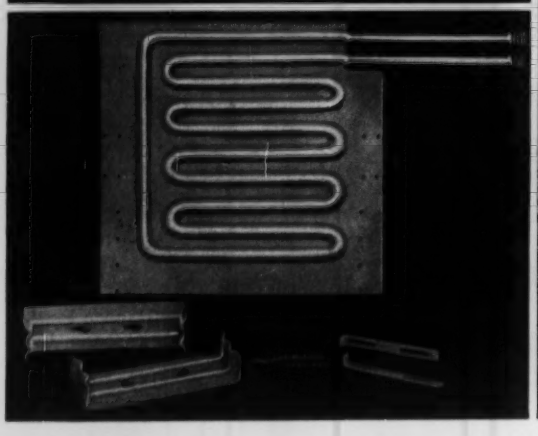
- TAPER-LOCK STEEL CONVEYOR PULLEYS. Construction details, sizes, dimensions. Bulletin D-56.
- TAPER-LOCK Sprockets, Chain Couplings and Dodge Roller Chain. Technical information—selection, installation and maintenance data. Bulletin A-644.

Write for your copies.

DODGE MANUFACTURING CORPORATION
4400 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

Caught in the cost squeeze?



Large or Small, Complex or Simple— Stamped Parts Can Be Produced for Less . . .

DESIGNERS AND BUILDERS OF

- STEEL MILL MACHINERY
- HYDRAULIC PRESSES (Metalworking and Extrusion)
- CRUSHING MACHINERY
- SPECIAL MACHINERY
- STEEL CASTINGS
- Weldments "CAST-WELD" Design
- ROLLS: Steel, Alloy Iron, Alloy Steel

● . . . and the key is Birdsboro's specialized Hydraulic Press design. You can get the steady, high output you need to keep production costs down, yet gain new freedom from maintenance problems. And with Birdsboro's advanced engineering outlook, you are assured of the versatility you may need as diversification and new methods change your production plans. Strike now at rising costs. Call in a Birdsboro representative to look over your present press setup. He may have the answers you've been seeking.

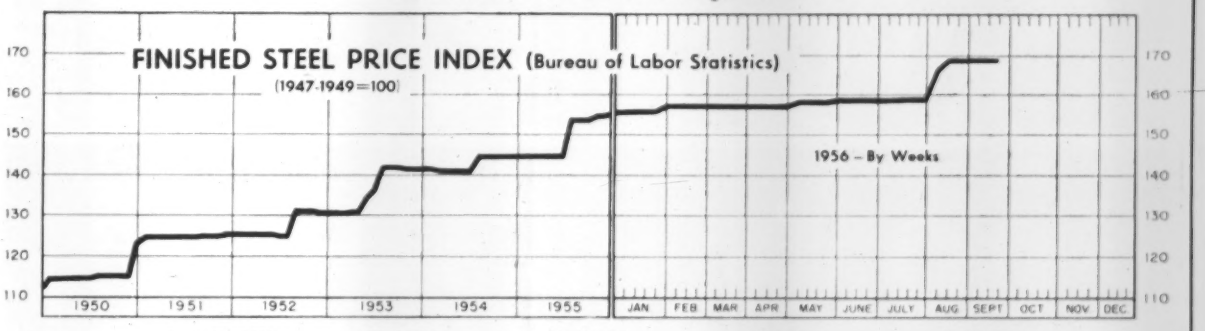
HP 28-66

BIRDSBORO

BIRDSBORO STEEL FOUNDRY & MACHINE CO., Main Offices in Birdsboro, Pa. District Office: Pittsburgh, Pa.

New York Office: Engineering Supervision Co., 120 West 42nd Street, New York 36, N.Y.

Price Indexes and Composites



Sept. 18, 1956	Week Ago	Month Ago	Aug. Avg.	Year ago
168.6	168.6	168.6	168.6	153.9

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Sept. 18

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.150	Bars, Reinforcing	5.738
Rails, Light, 40 lb	6.567	Bars, C.F., Carbon	9.610
Tie Plates	6.025	Bars, C.F., Alloy	13.275
Axles, Railway	8.950	Bars, C.F., Stainless, 302 (lb)	0.508
Wheels, Freight Car, 33 in. (per wheel)	57.50	Sheets, H.R., Carbon	5.695
Plates, Carbon	5.550	Sheets, C.R., Carbon	6.639
Structural Shapes	5.267	Sheets, Galvanized	8.220
Bars, Tool Steel, Carbon (lb)	0.480	Sheets, C.R., Stainless, 302 (lb)	0.635
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.585	Sheets, Electrical	11.225
Bars, Tool Steel, H. R. Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.274	Strip, C.R., Carbon	8.843
Bars, Tool Steel, H.R., Alloy, High Speed W18 Cr 4, V 1 (lb)	1.769	Strip, C.R., Stainless, 403 (lb)	0.475
Bars, H.R., Alloy	10.025	Strip, H.R., Carbon	5.900
Bars, H.R., Stainless, 303 (lb)	0.483	Pipe, Black, Buttweld (100 ft)	18.376
Bars, H.R., Carbon	5.925	Pipe, Galv., Buttweld (100 ft)	22.516
		Pipe, Line (100 ft)	182.860
		Casing, Oil Well, Carbon (100 ft)	178.046
		Casing, Oil Well, Alloy (100 ft)	276.870
		Tubes, Boiler (100 ft)	45.033
		Tubing, Mechanical, Carbon (100 ft)	22.973
		Tubing, Mechanical, Stainless, 304 (100 ft)	187.133
		Tin Plate, Hot-dipped, 1.25 lb	9.333
		Tin Plate, Electrolytic, 0.25 lb	8.033
		Black Plate, Canmaking Quality	7.133
		Wire, Drawn, Carbon	9.175
		Wire, Drawn, Stainless, 430 (lb)	0.630
		Bale ties (bundle)	7.213
		Nails, Wire, 8d Common	9.368
		Wire, Barbed (80-rod spool)	8.412
		Woven Wire Fence (20-rod roll)	20.505

STEEL's FINISHED STEEL PRICE INDEX*

	Sept. 19 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	225.71	225.71	225.71	207.63	171.92
Index in cents per lb	6.114	6.114	6.114	5.625	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$137.75	$137.75	$137.75	$127.41	$106.32
No. 2 Fdry Pig Iron, GT	62.63	62.63	62.63	58.99	52.54
Basic Pig Iron, GT	62.18	62.18	62.18	58.49	52.16
Malleable Pig Iron, GT	63.41	63.41	63.41	59.77	53.27
SteelmakingScrap, GT	59.67	59.67	58.17	44.33	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Sept. 19 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	5.075	5.075	5.075	4.65	3.70
Bars, H.R., Chicago	5.075	5.075	5.075	4.65	3.70
Bars, H.R., deld. Philadelphia	4.93	4.93	4.93	4.90	4.223
Bars, C.F., Pittsburgh	6.85*	6.85*	6.85*	5.90	4.55
Shapes, Std., Pittsburgh	5.00	5.00	5.00	4.60	3.65
Shapes, Std., Chicago	5.00	5.00	5.00	4.60	3.65
Shapes, deld. Philadelphia	5.00	5.00	5.00	4.88	3.918
Plates, Pittsburgh	4.85	4.85	4.85	4.50	3.70
Plates, Chicago	4.85	4.85	4.85	4.50	3.70
Plates, Coatesville, Pa.	5.25	5.25	5.25	4.50	4.15
Plates, Sparrows Point, Md.	4.85	4.85	4.85	4.50	3.70
Plates, Claymont, Del.	5.35	5.35	5.35	4.50	4.15
Sheets, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.60-3.75
Sheets, H.R., Chicago	4.675	4.675	4.675	4.325	3.60
Sheets, C.R., Pittsburgh	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Chicago	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Detroit	5.75-5.85	5.75-5.85	5.75-5.85	5.325-5.425	4.55
Sheets, Galv., Pittsburgh	6.30	6.30	6.30	5.85	4.80
Strip, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.75-4.00
Strip, H.R., Chicago	4.675	4.675	4.675	4.325	3.50
Strip, C.R., Pittsburgh	6.85	6.85	6.85	6.25-6.45	4.65-5.35
Strip, C.R., Chicago	6.85	6.85	6.85	6.35-6.45	4.90
Strip, C.R., Detroit	6.95	6.95	6.95	6.35	4.85-5.60
Wire, Basic, Pittsburgh	7.20	7.20	7.20	6.25	4.85-5.10
Nails, Wire, Pittsburgh	8.35	8.35	8.35	7.60	5.90-6.20
Tin plate (1.50 lb.) box, Pitts.	$9.85	$9.85	$9.85	$9.05	$8.70

*Including 0.35c for special quality

SEMIFINISHED STEEL					
Billets forging, Pitts. (NT)	$91.50	$91.50	$91.50	$84.50	$66.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	5.80	5.80	5.80	5.025	4.10-4.30

PIG IRON, Gross Ton	Sept. 19 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$63.50	$63.50	$63.50	$59.50	$53.00
Basic, Valley	62.50	62.50	62.50	58.50	52.00
Basic, deld. Phila.	66.26	66.26	66.26	59.16	56.61
No. 2 Fdry, NevilleIsland, Pa.	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, Chicago	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, deld. Phila.	66.76	66.76	66.76	59.66	57.11
No. 2 Fdry, Birm.	59.00	59.00	59.00	55.00	48.88
No. 2 Fdry (Birm.) deld. Cin.	66.70	66.70	66.70	62.70	55.49
Malleable, Valley	63.00	63.00	63.00	59.00	52.50
Malleable, Chicago	63.00	63.00	63.00	59.00	52.50
Ferromanganese, Duquesne	215.00†	215.00†	215.00†	190.00†	188.00*

†74-76% Mn. net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$58.50	$58.50	$57.50	$43.50	$45.00
No. 1 Heavy Melt E. Pa.	59.00	59.00	58.00	46.50	43.50
No. 1 Heavy Melt, Chicago	61.50	61.50	59.00	43.00	43.50
No. 1 Heavy Melt, Valley	65.50	65.50	64.50	46.50	45.00
No. 1 Heavy Melt, Cleve.	63.00	63.00	62.00	44.00	44.00
No. 1 Heavy Melt, Buffalo	56.50	56.50	56.50	38.50	44.00
Rails, Rerolling, Chicago	84.50	84.50	83.50	64.50	52.50
No. 1 Cast, Chicago	53.50	53.50	53.50	47.50	49.00

COKE, Net Ton					
Beehive, Furn. Connlsvl.	$14.50	$14.50	$14.50	$13.625	$14.75
Beehive, Fdry, Connlsvl.	17.50	17.50	17.50	16.50	17.50

VOTE + but

Study the issues and the candidates—and then decide where you stand

You wouldn't buy a new car without at least driving it around the block.

You wouldn't buy a new house without checking up on the neighborhood, the schools, and any back taxes.

So vote—but don't vote in the dark in this exciting election year.

Listen to what candidates are saying on TV and radio.

Read your newspapers—especially the political news and editorial page.

Talk things out with your neighbors over the back fence and at the filling station on the corner. Take part in the discussion group at your church, club, lodge, or school.

Think about the issues and the candidates—and then make up your own mind. Remember, nobody is in that voting booth but you and your conscience. Step behind that curtain with pride on election day. Then vote as a free American.

VOTER'S CHECKLIST

1. **Be sure you're registered.**
2. **Study the issues and candidates.** Go to rallies. Ask questions. Read the papers. Listen to speeches.
3. **Mark up a sample ballot** in advance. (They are published in the papers.)
4. **Join your neighbors at the polls on Election Day November 6th.**

Is your name in the book?

You can't vote if you're not registered. You lock yourself out of the polls, unless you're a registered voter. And you and only you can get your name in the Registration Book. When they call the roll on election day, will you be there? Do you know anyone who won't?

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers page 160; to footnotes, page 162.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 .....$70.50

INGOTS, Alloy (NT)

Detroit R7 .....$74.00
Houston 85 .....74.00
Midland,Pa. C18 .....74.00
Munhall,Pa. U5 .....74.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)

Aliquippa,Pa. J5 ....$74.00
Bessemer,Pa. U5 .....74.00
Bridgeport,Conn. N19..79.00
Buffalo R2 .....74.00
Clairton,Pa. U5 .....74.00
Ensley,Ala. T2 .....74.00
Fairfield,Ala. T2 .....74.00
Fontana,Calif. K1 ...83.50
Gary,Ind. U5 .....74.00
Johnstown,Pa. B2 ....74.00
Lackawanna,N.Y. B2..74.00
LoneStar,Tex. L6 ....74.50
Munhall,Pa. U5 .....74.00
Pittsburgh J5 .....74.00
S.Chicago,Ill. R2, U5..74.00
S.Duquesne,Pa. U5 ....74.00
Sterling,Ill. N15 .....74.00
Youngstown R2 .....74.00

Carbon, Forging (NT)

Aliquippa,Pa. J5 ....$91.50
Bessemer,Pa. U5 .....91.50
Bridgeport,Conn. N19 ..96.50
Buffalo R2 .....91.50
Canton,O. R2 .....94.00
Clairton,Pa. U5 .....91.50
Conshohocken,Pa. A3 ..96.50
Ensley,Ala. T2 .....91.50
Fairfield,Ala. T2 .....91.50
Fontana,Calif. K1 ....101.00
Gary,Ind. U5 .....91.50
Geneva,Utah C11 .....91.50
Houston 85 .....96.50
Johnstown,Pa. B2 ....91.50
Lackawanna,N.Y. B2 ..91.50
LosAngeles B3 .....101.00
Midland,Pa. C18 .....91.50
Munhall,Pa. U5 .....91.50
Pittsburgh J5 .....91.50
Seattle B3 .....105.00
S.Chicago R2, U5, W14 91.50
S.Duquesne,Pa. U5 ....91.50
S.SanFrancisco B3 ...101.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..$107.00
Bridgeport,Conn. N19 .107.00
Buffalo R2 .....107.00
Canton,O. R2 .....107.00
Conshohocken,Pa. A3 .114.00
Detroit R7 .....107.00
Fontana,Calif. K1 ....128.00
Gary,Ind. U5 .....107.00
Houston 85 .....112.00
Ind.Harbor,Ind. Y1 ..107.00
Johnstown,Pa. B2 ....107.00
Lackawanna,N.Y. B2 .107.00
LosAngeles B3 .....127.00
Massillon,O. R2 .....107.00
Midland,Pa. C18 .....107.00
Munhall,Pa. U5 .....107.00
S.Chicago R2,U5,W14..107.00
S.Duquesne,Pa. U5 ..107.00
Struthers,O. Y1 .....107.00
Warren,O. C17 .....107.00

ROUNDS, SEAMLESS TUBE (NT)

Bridgeport,Conn. N19 $116.50
Buffalo R2 .....111.50
Canton,O. R2 .....114.00
Cleveland R2 .....111.50
Gary,Ind. U5 .....111.50
S.Chicago,Ill. R2, W14 111.50
S. Duquesne,Pa. U5 ..111.50

SKELP

Aliquippa,Pa. J5 ....4.725
LoneStar,Tex. L6 ....4.625
Munhall,Pa. U5 .....4.625
SparrowsPoint,Md. B2 .4.625
Warren,O. R2 .....4.625
Youngstown R2, U5 ..4.625

WIRE RODS

AlabamaCity,Ala. R2 ..5.80
Aliquippa,Pa. J5 .....5.80
Alton,Ill. L1 .....6.00
Buffalo W12 .....5.80
Cleveland A7 .....5.80
Donora,Pa. A7 .....5.80
Fairfield,Ala. T2 .....5.80
Houston 85 .....6.05
IndianaHarbor,Ind. Y1 .5.80
Johnstown,Pa. B2 .....5.80
Joliet,Ill. A7 .....5.80
KansasCity,Mo. 85 ....6.05
Kokomo,Ind. C16 .....5.90
LosAngeles B3 .....6.60
Minnequa,Colo. C10 ....6.05
Monessen,Pa. P7 .....5.80
N.Tonawanda,N.Y. B11..5.80
Pittsburg,Calif. C11 ....6.45
Portsmouth,O. P12 .....5.80
Roebling,N.J. R5 .....5.90
S.Chicago,Ill. R2 .....5.80
SparrowsPoint,Md. B2 ..5.90
Sterling,Ill.(1) N15 ....5.80
Sterling Ill. N15 .....5.90
Struthers,O. Y1 .....5.80
Worcester,Mass. A7 ....6.10

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....5.00
Aliquippa,Pa. J5 .....5.00
Bessemer,Ala. T2 .....5.00
Bethlehem,Pa. B2 .....5.05
Birmingham C15 .....5.30
Clairton,Pa. U5 .....5.00
Fairfield,Ala. T2 .....5.00
Fontana,Calif. K1 ....5.70
Gary,Ind. U5 .....5.00
Geneva,Utah C11 .....5.00
Houston 85 .....5.10
Ind.Harbor,Ind. I-2 ....5.00
Johnstown,Pa. B2 .....5.05
KansasCity,Mo. 85 .....5.10
Lackawanna,N.Y. B2 ..5.05
LosAngeles B3 .....5.70
Minnequa,Colo. C10 ....5.30
Munhall,Pa. U5 .....5.00
Niles,Calif. P1 .....5.75
Phoenixville,Pa. P4 ....5.85
Portland,Oreg. O4 .....5.80
Seattle B3 .....5.75
S.Chicago,Ill. U5, W14 ..5.00
S.SanFrancisco B3 ....5.65
Sterling,Ill. N15 .....5.00
Torrance,Calif. C11 ....5.70
Weirton,W.Va., W6 ....5.00

Wide Flange

Bethlehem,Pa. B2 .....5.05
Clairton,Pa. U5 .....5.00
Fontana,Calif. K1 .....5.85
IndianaHarbor,Ind. I-2..5.00
Lackawanna,N.Y. B2 ..5.05
Munhall,Pa. U5 .....5.00
Phoenixville,Pa. P4 ....5.85
S.Chicago,Ill. U5 .....5.00

Alloy Std. Shapes

Clairton,Pa. U5 .....6.20
Fontana,Calif. K1 .....7.85
Gary,Ind. U5 .....6.20
Houston 85 .....6.30
Munhall,Pa. U5 .....6.20
S.Chicago,Ill. U5 .....6.20

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....7.35
Bessemer,Ala. T2 .....7.35
Bethlehem,Pa. B2 .....7.40
Clairton,Pa. U5 .....7.35
Fairfield,Ala. T2 .....7.35
Fontana,Calif. K1 ....8.05
Gary,Ind. U5 .....7.35
Geneva,Utah C11 .....7.35
Houston 85 .....7.45
Ind.Harbor,Ind. I-2, Y1 7.35
Johnstown,Pa. B2 .....7.40
KansasCity,Mo. 85 ....7.45
Lackawanna,N.Y. B2 ...7.40
LosAngeles B3 .....8.05
Munhall,Pa. U5 .....7.35
Seattle B3 .....8.10
S.Chicago,Ill. U5, W14..7.35
S.SanFrancisco B3 ....8.00
Struthers,O. Y1 .....7.35

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....7.40
Ind.Harbor,Ind. I-2 ....7.35
Lackawanna,N.Y. B2 ...7.40
Munhall,Pa. U5 .....7.35
S.Chicago,Ill. U5 .....7.35

PILING

BEARING PILES

Bethlehem,Pa. B2 ....4.65
Lackawanna,N.Y. B2....4.65
Munhall,Pa. U5 .....5.00
S.Chicago,Ill. U5 .....5.00

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....5.90
Lackawanna,N.Y. B2 ...5.90
Munhall,Pa. U5 .....5.90
S.Chicago,Ill. U5 .....5.90

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....6.85
Aliquippa,Pa. J5 .....6.85
Ashland,Ky. (15) A10...6.85
Bessemer,Ala. T2 .....6.85
Bridgeport,Conn. N19 ..6.75
Clairton,Pa. U5 .....6.85
Claymont, Del. C22 ....6.95
Cleveland J5, R2 .....6.95
Coatesville,Pa. L7 ....6.25
Conshohocken,Pa. A3 ..6.90
Detroit M1 .....6.60
Ecorse,Mich. G5 .....6.95
Fairfield,Ala. T2 .....6.85
Fontana,Calif.(30) K1 ..6.55
Gary,Ind. U5 .....6.85
Geneva,Utah C11 .....6.85
GraniteCity,Ill. G4 ....6.05
Harrisburg,Pa. P4 .....6.80
Houston 85 .....6.95
Ind.Harbor,Ind. I-2, Y1 6.85
Johnstown,Pa. B2 .....6.85
Lackawanna,N.Y. B2 ..6.85
LoneStar,Tex. L6 .....6.85
Minnequa,Colo. C10 ....6.70
Munhall,Pa. U5 .....6.85
Newport,Ky. N9 .....6.85
Pittsburgh J5 .....6.85
Riverdale,Ill. A1 .....6.85
Seattle B3 .....6.75
Sharon,Pa. S3 .....6.85
S.Chicago,Ill. U5, W14 ..6.85
SparrowsPoint,Md. B2 ..6.85
Steubenville,O. W10 ...6.85
Warren,O. R2 .....6.85
Weirton,W.Va. W6 .....6.85
Youngstown R2, U5, Y1 6.85

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 ....6.20
Fontana,Calif. K1 ....6.70
Geneva,Utah C11 .....6.00
Johnstown,Pa. B2 .....5.65
SparrowsPointMd. B2 ..5.65

PLATES, Wrought Iron

Economy,Pa. B14 ....11.128

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 .....7.25
Bessemer,Ala. T2 .....7.25
Clairton,Pa. U5 .....7.25
Claymont,Del. C22 ....7.55
Cleveland J5, R2 .....7.25
Coatesville,Pa. L7 .....7.55
Conshohocken,Pa. A3 ..7.25
Ecorse,Mich. G5 .....7.35
Fairfield,Ala. T2 .....7.25
Fontana,Calif.(30) K1 .7.95
Gary,Ind. U5 .....7.25
Geneva,Utah C11 .....7.25
Houston 85 .....7.35
Ind.Harbor,Ind. I-2, Y1 7.25
Johnstown,Pa. B2 .....7.25
Munhall,Pa. U5 .....7.25
Pittsburgh J5 .....7.25
Seattle B3 .....8.15
Sharon,Pa. S3 .....7.25
S.Chicago,Ill. U5, W14 ..7.25
SparrowsPoint,Md. B2 ..7.25
Warren,O. R2 .....7.25
Youngstown U5, Y1 ....7.25

PLATES, Alloy

Bridgeport,Conn. N19 ..6.55
Claymont,Del. C22 ....6.85
Coatesville,Pa. L7 .....6.85
Fontana,Calif.(30) K1 ..7.55
Gary,Ind. U5 .....6.85
Houston 85 .....6.95
Ind.Harbor,Ind. Y1 ...6.85
Johnstown,Pa. B2 .....6.85
Munhall,Pa. U5 .....6.85
Newport,Ky. N9 .....6.85
Seattle, B3 .....7.75
Sharon,Pa. S3 .....6.85
S.Chicago,Ill. U5, W14 ..6.85
SparrowsPoint,Md. B2 ..6.85
Youngstown Y1 .....6.85

FLOOR PLATES

Cleveland J5 .....5.925
Conshohocken,Pa. A3 ..5.925
Harrisburg,Pa. P4 ....6.275
Ind.Harbor,Ind. I-2....5.925
Munhall,Pa. U5 .....5.925
S.Chicago,Ill. U5 .....5.925

PLATES, Ingot Iron

Ashland c.l. (15) A10 5.10
Ashland l.c.l. (15) A10..5.60
Cleveland c.l. R2 .....5.60
Warren,O. c.l. R2 .....5.60

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)

Ala.City,Ala. R2 .....5.075
Aliquippa,Pa(9) J5 ...5.075
Alton,Ill. L1 .....5.275
Atlanta(9) A11 .....5.575
Bessemer,Ala.(9) T2 ..5.075
Birmingham(9) C15 ...5.375
Bridgeport,Conn. N19 ..5.30
Buffalo(9) R2 .....5.075
Clairton,Pa. U5 .....5.075
Cleveland(9) R2 .....5.075
Ecorse,Mich.(9) G5 ...5.175
Emeryville,Calif. J7 ....5.85
Fairfield,Ala. T2 .....5.075
Fairless,Pa.(9) U5 ....5.225
Fontana,Calif.(9) K1 ..5.775
Gary,Ind.(9) U5 .....5.075
Geneva(9) C11 .....5.175
Houston(9) 85 .....5.325
Ind.Harbor(9) I-2, Y1 .5.075
Johnstown,Pa.(9) B2 ..5.075
Joliet,Ill. P22 .....5.575
KansasCity,Mo.(9) 85 .5.325
Lackawanna(9) B2 .....5.075
LosAngeles(9) B3 .....5.775
Midland,Pa.(9) C18 .....5.425
Milton,Pa.(23) M18 ...5.425
Minnequa,Colo. C10 ...5.525
Niles,Calif. P1 .....5.85
N.T'wanda,N.Y.(9)B11 5.075
Pittsburg,Calif.(9) C11..5.775
Pittsburgh(9) J5 .....5.075
Portland,Oreg. O4 .....5.85
Seattle B3, N14 .....5.825
S.Cl 'e'go(9) R2,U5,W14 5.075
S.Duquesne,Pa.(9) U5 .5.075
S.SanFran.,Calif.(9) B3 5.825
Sterling,Ill.(1) N15 ...5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Torrance,Calif.(9) C11..5.775
Weirton,W.Va.(9) W6 ...5.075
Youngstown(9) R2, U5..5.075

BARS, H.R. Leaded Alloy

Warren,O. C17 .....7.125

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....6.125
Bridgeport,Conn. N19 ..6.20
Buffalo R2 .....6.125
Canton,O. R2 .....6.125
Clairton,Pa. U5 .....6.125
Detroit R7 .....6.125
Ecorse,Mich. G5 .....6.225
Fairless,Pa. U5 .....6.275
Fontana,Calif. K1 .....7.175
Gary,Ind. U5 .....6.125
Houston 85 .....6.375
Ind.Harbor,Ind. I-2, Y1 6.125
Johnstown,Pa. B2 .....6.125
KansasCity,Mo. 85 ...6.375
Lackawanna,N.Y. B2 ..6.125
LosAngeles B3 .....7.175
Massillon,O. R2 .....6.125
Midland,Pa. C18 .....6.125
S.Chicago R2, U5, W14 6.125
S.Duquesne,Pa. U5 ....6.125
Struthers,O. Y1 .....6.125
Warren,O. C17 .....6.125
Youngstown U5 .....6.125

BARS & SMALL SHAPES, H.R.
High-Strength Low-Alloy

Aliquippa,Pa. J5 .....7.425
Bessemer,Ala. T2 .....7.425
Bethlehem,Pa. B2 .....7.425
Bridgeport,Conn. N19 ..7.50
Clairton,Pa. U5 .....7.425
Cleveland R2 .....7.425
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.425
Fontana,Calif. K1 .....8.125
Gary,Ind. U5 .....7.425
Houston 85 .....7.675
Ind.Harbor..Ind. Y1 ..7.425
Johnstown,Pa. B2 .....7.425
KansasCity,Mo. 85 ....7.675
Lackawanna,N.Y. B2 ..7.425
LosAngeles B3 .....8.125
Pittsburgh J5 .....7.425
Seattle B3 .....8.175
S.Chicago U5, W14 .....7.425
S.Duquesne,Pa. U5 ....7.425
S.SanFrancisco B3 ....8.175
Struthers,O. Y1 .....7.425
Youngstown U5 .....7.425

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.225
Lackawanna(9) B2 .....5.075
Sterling,Ill. N15 .....5.175
Sterling,Ill.(1) N15 ....5.075

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....5.075
Atlanta A11 .....5.575
Fontana,Calif. K1 .....5.35
Joliet,Ill. P22 .....5.10
Niles,Calif. P1 .....5.85
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....5.85
SanFrancisco S7 .....5.95

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 .....6.20
Gary,Ind. U5 .....6.20
Houston 85 .....6.45
KansasCity,Mo. 85 ....6.45
Youngstown U5 .....6.20

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18 ....9.225
Chicago W18 .....9.225
Cleveland C20 .....8.325
LosAngeles S30 .....10.60
Monaca,Pa. S17 .....9.225
Newark,N.J. W18 .....9.40
SpringCity,Pa. K3 .....8.30
Warren,O. C17 .....9.475

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....6.85
BeaverFalls,Pa. M12,R2 6.85
Bridgeport,Conn. N19 ..7.20
Buffalo B5 .....6.90
Camden,N.J. P13 .....7.30
Carnegie,Pa. C12 .....6.85
Chicago W18 .....6.85
Cleveland A7, C20 .....6.85
Detroit B5, P17 .....7.05
Detroit R7 .....6.85
Donora,Pa. A7 .....6.85
Elyria,O. W8 .....6.85
FranklinPrk,Ill. N5 ....6.85
Gary,Ind. U5 .....6.85
GreenBay,Wis. F7 .....6.85
Hammond,Ind. L2, M13..6.85
Hartford,Conn. R2 ....7.35
Harvey,Ill. B5 .....6.85
LosAngeles(49) S30 ....8.30
LosAngeles R2 .....8.30
Mansfield,Mass. B5 ....7.40
Massillon,O. R2, R8 ...6.85
Midland,Pa. C18 .....6.85
Monaca,Pa. S17 .....6.85
Newark,N.J. W18 .....7.30
NewCastle,Pa.(17) B4 ..6.85
Pittsburgh J5 .....6.85
Plymouth,Mich. P5 ....7.10
Putnam,Conn. W18 ....7.40
Readville,Mass. C14 ....7.40
S.Chicago,Ill. W14 ....6.85
SpringCity,Pa. K3 ....7.30
Struthers,O. Y1 .....6.85
Waukegan,Ill. A7 .....6.85
Youngstown F3, Y1 ....6.85

BARS, Cold-Finished Carbon
(Turned and Ground)

Cumberland,Md.(5) C19..6.10

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....8.325
BeaverFalls,Pa. M12,R28.325
Bethlehem,Pa. B2 .....8.325
Bridgeport,Conn. N19 ..8.475
Buffalo B5 .....8.325
Camden,N.J. P13 .....8.50
Canton,O. T7 .....7.425
Carnegie,Pa. C12 .....8.325
Chicago W18 .....8.325
Cleveland A7, C20 .....8.325
Detroit B5, P17 .....8.525
Detroit R7 .....8.325
Donora,Pa. A7 .....8.325
Elyria,O. W8 .....8.325
FranklinPark,Ill. N5 ..8.325
Gary,Ind. R2 .....8.325
GreenBay,Wis. F7 .....8.325
Hammond,Ind. L2,M13 8.325
Hartford,Conn. R2 ....8.625
Harvey,Ill. B5 .....8.325
Lackawanna,N.Y. B2 ..8.325
LosAngeles S30 .....10.10
Mansfield Mass. B5 ....8.625
Massillon,O. R2, R8 ...8.325
Midland,Pa. C18 .....8.325
Monaca,Pa. S17 .....8.325
Newark,N.J. W18 .....8.50
Plymouth,Mich. P5 ....8.525
S.Chicago W14 .....8.325
SpringCity,Pa. K3 ....8.50
Struthers,O. Y1 .....8.325
Warren,O. C17 .....8.325
Waukegan,Ill. A7 .....8.325
Worcester,Mass. A7 ....8.625
Youngstown F3, Y1 ....8.325

BARS, Reinforcing
(To Fabricators)

Ala.City,Ala. R2 .....5.075
Atlanta A11 .....5.575
Birmingham C15 .....5.375
Bridgeport,Conn. N19 ..5.30
Buffalo R2 .....5.075
Cleveland R2 .....5.075
Ecorse,Mich. G5 .....5.425
Emeryville,Calif. J7 ....5.85
Fairfield,Ala. T2 .....5.075
Fairless,Pa. U5 .....5.225
Fontana,Calif. K1 .....5.80

Ft.Worth,Tex.(42) T4 .5.525
Gary,Ind. U5 .....5.075
Houston 85 .....5.325
Ind.Harbor,Ind. I-2, Y1 5.075
Johnstown,Pa. B2 .....5.075
Joliet,Ill. P22 .....5.575
KansasCity,Mo. 85 ...5.325
Lackawanna,N.Y. B2 ...5.075
LosAngeles B3 .....5.775
Milton,Pa. M18 .....5.225
Minnequa,Colo. C10 ..5.525
Niles,Calif. P1 .....5.85
Pittsburg,Calif. C11 ..5.775
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....5.85
SandSprings,Okla. 85..5.575
Seattle B3, N14 .....5.825
S.Chicago R2 .....5.075
S.Duquesne,Pa. U5 ...5.075
S.SanFrancisco B3 ....5.825
SparrowsPoint,Md. B2 5.075
Sterling,Ill.(1) N15 ...5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Torrance,Calif. C11 ...5.775
Youngstown R2, U5....5.075

BARS, Reinforcing (Fabricated; to Consumers)

Chicago U8 .....6.81
Cleveland U8 .....6.79
Johnstown,Pa. ¼-1" B2.6.73
KansasCity,Kans. 85 ..6.825
Marion,O. P11 .....6.15
New York U8 .....7.18
Pittsburgh U8 .....6.75
Seattle B3, N14 .....7.20
SparrowsPt. ½-1" B2 ..6.73
Williamsport,Pa. S19 ..6.65

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2.5.075
ChicagoHts.(4) I-2 ....5.075
ChicagoHts.(4) C2 .....5.65
Ft.Worth,Tex.(26) T4..5.525
Franklin,Pa.(4) F5 ....5.60
Franklin,Pa.(3) F5 ....5.10
JerseyShore,Pa.(4) J8 ..5.00
Marion,O.(3) P11 .....4.65
Moline,Ill.(3) R2 .....5.225
Tonawanda(3) B12 .....5.65
Tonawanda(4) B12 .....6.15
Williamsport,Pa.(3) S19.5.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 12.305
Economy,Pa.(D.R.)B14 15.301
Economy(Staybolt)B14 15.676
McK.Rks.(S.R.) L5 ..12.305
McK.Rks.(D.R.) L5 ...16.00
McK.Rks.(Staybolt) L5.17.00

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2 .....4.675
Allenport,Pa. P7 .....4.675
Ashland,Ky.(8) A10 ..4.675
Cleveland J5, R2 ....4.675
Conshohocken,Pa. A3 .4.725
Detroit(8) M1 .....4.775
Dravosburg,Pa. U5 ....4.675
Ecorse,Mich. G5 .....4.775
Fairfield,Ala. T2 .....4.675
Fairless,Pa. U5 .....4.725
Fontana,Calif. K1 ....5.475
Gary,Ind. U5 .....4.675
Geneva,Utah C11 .....4.775
GraniteCity,Ill.(8) G4..4.875
Ind.Harbor,Ind. I-2, Y1 4.675
Lackawanna,N.Y. B2..4.675
Munhall,Pa. U5 .....4.675
Newport,Ky.(8) N9 ..4.675
Niles,O. M21 .....4.675
Pittsburg,Calif. C11 ..5.375
Pittsburgh J5 .....4.675
Portsmouth,O. P12 ....4.675
Riverdale,Ill. A1 .....4.675
Sharon,Pa. S3 .....4.675
S.Chicago,Ill. W14 ...4.675
SparrowsPoint,Md. B2..4.675
Steubenville,O. W10 ..4.675
Warren,O. R2 .....4.675
Weirton,W.Va. W6 ....4.675
Youngstown U5, Y1 ..4.675

SHEETS, H.R., (19 ga. & Lighter)

Niles,O. M21 .....5.75

SHEETS, H.R. Alloy

Dravosburg,Pa. U5 .....7.75
Gary,Ind. U5 .....7.75
Ind.Harbor,Ind. Y1 ...7.75
Newport,Ky. N9 .....7.75
Youngstown Y1, U5 ...7.75

SHEETS, H.R. (14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 .....6.90
Conshohocken,Pa. A3 ..6.95
Dravosburg,Pa. U5 ....6.90
Ecorse,Mich. G5.....7.00
Fairfield,Ala. T2 .....6.90
Fairless,Pa. U5 .....6.95
Fontana,Calif. K1 .....7.70
Gary,Ind. U5 .....6.90
Ind.Harbor,Ind. I-2, Y1 6.90
Lackawanna(35) B2 ....6.90
Munhall,Pa. U5 .....6.90
Pittsburgh J5 .....6.90
S.Chicago,Ill. U5 .....6.90
SparrowsPoint(36) B2 ..6.90
Warren,O. R2 .....6.90
Weirton,W.Va. W6 ....6.90
Youngstown U5, Y1 ....6.90

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.925
Cleveland R2 .....5.425
Ind.Harbor,Ind. I-2 ...4.925
Warren,O. R2 .....5.425

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 .....5.75
Cleveland J5, R2 .....5.75
Conshohocken,Pa. A3 ..5.80
Dravosburg,Pa. U5 ....5.75
Detroit M1 .....5.75
Ecorse,Mich. G5 .....5.85
Fairfield,Ala. T2 .....5.75
Fairless,Pa. U5 .....5.80
Follansbee,W.Va. F4 ..5.75
Fontana,Calif. K1 .....6.95
Gary,Ind. U5 .....5.75
GraniteCity,Ill. G4 ...5.95
Ind.Harbor,Ind. I-2, Y1 5.75
Lackawanna,N.Y. B2 ..5.75
Mansfield,O. E6 .....5.75
Middletown,O. A10 ....5.75
Newport,Ky. N9 .....5.75
Pittsburg,Calif. C11 ..6.70
Pittsburgh J5 .....5.75
Portsmouth,O. P12 ....5.75
SparrowsPoint,Md. B2 .5.75
Steubenville,O. W10 ....5.75
Warren,O. R2 .....5.75
Weirton,W.Va. W6 ....5.75
Youngstown Y1 .....5.75

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2 .....8.525
Dravosburg,Pa. U5 ....8.525
Ecorse,Mich. G5 .....8.625
Fairless,Pa. U5 .....8.575
Fontana,Calif. K1 ....9.725
Gary,Ind. U5 .....8.525
IndianaHarbor,Ind. Y1.8.525
Lackawanna(37) B2 ..8.525
Pittsburgh J5 .....8.525
SparrowsPoint(38) B2 .8.525
Warren,O. R2 .....8.525
Weirton,W.Va. W6 ....8.525
Youngstown Y1 .....8.525

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.50
Middletown,O. A10 ....6.25
Warren,O. R2 .....6.50

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	6.65	6.90
Canton,O. R2	6.65	7.15
Dravosburg U5	6.65	6.90
Fairfield T2	6.65	6.90
Gary,Ind. U5	6.65	6.90
Ind.Harbor I-2	6.65	6.90
Kokomo,Ind. C16	6.75	...
MartinsFry. W10	6.65	...
Pitts.,Calif. C11	7.40	...
SparrowsPt. B2	6.65	...

SHEETS, Culvert—Pure Iron

Dravosburg U5 .....6.90
Gary,Ind. U5 .....6.90
Ind.Harbor,Ind. I-2 ....6.90
MartinsFry.,O. W10 ....6.90

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 .....6.30‡
Ashland,Ky. A10 .....6.30‡
Canton,O. R2 .....6.30‡
Dover,O. R1 .....6.30†
Dravosburg,Pa. U5 ....6.30†
Fairfield,Ala. T2 .....6.30†
Gary,Ind. U5 .....6.30†
GraniteCity,Ill. G4 ....6.50‡
Ind.Harbor,Ind. I-2 ...6.30†
Kokomo,Ind. C16 .....6.40‡
MartinsFerry,O. W10 ..6.30*
Middletown,O. A10 ....6.30†
Pittsburg,Calif. C11 ...7.05*
Pittsburgh J5 .....6.30†
SparrowsPt.,Md. B2 ..6.30†
Warren,O. R2 .....6.30†
Weirton,W.Va. W6 ....6.30*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....6.975

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg,Pa. U5 ...9.275
SparrowsPoint(39) B2..9.275

SHEETS, Galvannealed Steel

Canton,O. R2 .....6.70
Dravosburg,Pa. U5 ....6.70
Kokomo,Ind. C16 .....7.00

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland,Ky. A10 .....6.55
Middletown,O. A10 .....6.55

SHEETS, Electrogalvanized

Cleveland(28) R2.....7.125
Niles,O.(28) R2 .....7.125
Weirton,W.Va. W6 ....6.975

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 8.95
Butler,Pa. A10 (type 2) 9.05

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.325
Cleveland R2 .....6.325
Dravosburg,Pa. U5 ....6.325
Gary,Ind. U5 .....6.325
GraniteCity,Ill. G4 ...6.525
Ind.Harbor,Ind. I-2, Y1 6.325
Middletown,O. A10 ...6.325
Niles,O. M21 .....6.325
Youngstown Y1 .....6.325

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ..8.35
Ind.Harbor,Ind. I-2 ...8.175
Yorkville,O. W10 .....8.175

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10 6.70
Gary,Ind. U5 .....6.70
Mansfield,O. E6 .....6.70
Middletown,O. A10 ....6.70
Niles,O. M21 .....6.70
Weirton,W.Va. W6 ....6.70

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.10

Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Dearborn Division Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Division, Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 NationalStandard Co.
N2 National Supply Co.
N3 NationalTube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mill
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn.Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.675
Allenport,Pa. P7	4.675
Alton,Ill. L1	4.875
Ashland,Ky.(8) A10	4.675
Atlanta A11	4.875
Bessemer,Ala. T2	4.675
Birmingham C15	4.975
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.675
Conshohocken,Pa. A3	4.725
Detroit M1	4.775
Ecorse,Mich. G5	4.775
Fairfield,Ala. T2	4.675
Fontana,Calif. K1	5.475
Gary,Ind. U5	4.675
Houston 85	4.925
Ind.Harbor,Ind. I-2, Y1	4.675
Johnstown,Pa.(25) B2	4.675
KansasCity 85	4.925
Lackaw'na,N.Y.(25) B2	4.675
LosAngeles(25) B3	5.425
Minnequa,Colo. C10	5.775
Pittsburg,Calif. C11	5.425
Riverdale,Ill. A1	4.675
SanFrancisco 87	5.95
Seattle(25) B3	5.675
Seattle N14	5.675
Sharon,Pa. 83	4.675
S.Chicago,Ill. W14	4.675
S.SanFrancisco(25) B3	5.425
SparrowsPoint,Md. B2	4.675
Sterling,Ill.(1) N15	4.675
Sterling,Ill. N15	4.775
Torrance,Calif. C11	5.425
Warren,O. R2	4.675
Weirton,W.Va. W6	4.675
Youngstown U5	4.675

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.75
Dravosburg U5	7.75
Fontana,Calif. K1	9.65
Gary,Ind. U5	7.75
Ind.Harbor,Ind. Y1	7.75
Los Angeles B3	8.95
Newport,Ky. N9	7.75
Sharon,Pa. S3	7.75
S. Chicago W14	7.75
Youngstown U5, Y1	7.75

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2	6.95
Conshohocken,Pa. A3	6.95
Ecorse,Mich. G5	7.05
Fairfield,Ala. T2	6.95
Fontana,Calif. K1	8.025
Gary,Ind. U5	6.95
Houston 85	7.20
Ind.Harbor,Ind. I-2, Y1	6.95
KansasCity,Mo. 85	7.20
Lackawanna,N.Y. B2	6.95
LosAngeles(25) B3	7.70
Seattle(25) B3	7.95
Sharon,Pa. S3	6.95
S.SanFrancisco(25) B3	7.70
SparrowsPoint,Md. B2	6.95
Warren,O. R2	6.95
Weirton,W.Va. W6	6.95
Youngstown U5, Y1	6.95

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.925
Warren,O. R2	5.425

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.85
Baltimore T6	6.85
Boston T6	7.40
Buffalo S40	6.85
Cleveland A7, J5	6.85
Conshohocken,Pa. A3	6.90
Dearborn,Mich. D3	6.95
Detroit D2, M1, P20	6.95
Dover,O. G6	6.85
Ecorse,Mich. G5	6.95
Follansbee,W.Va. F4	6.85
Fontana,Calif. K1	8.60
FranklinPark,Ill. T6	6.95
Ind.Harbor,Ind. Y1	6.85
Indianapolis C8	7.00
Lackawanna,N.Y. B2	6.25
LosAngeles C1	8.90
NewBedford,Mass. R10	7.30
NewBritain(10) S15	6.85
NewCastle,Pa. B4, E5	6.85
NewHaven,Conn. D2	7.30
NewKensington,Pa. A6	6.85
Pawtucket,R.I. R3	7.50
Pawtucket,R.I. N8	7.40
Pittsburgh J5	6.85
Riverdale,Ill. A1	6.95
Rome,N.Y. (32) R6	6.85
Sharon,Pa. S3	6.85
SparrowsPt.,Md. B2	6.25
Trenton,N.J.(31) R5	8.40
Wallingford,Conn. W2	7.30
Warren,O. R2, T5	6.85
Weirton,W.Va. W6	6.85
Worcester,Mass. A7	7.40
Youngstown C8, Y1	6.85

STRIP, Cold-Rolled Alloy

Boston T6	14.90
Carnegie,Pa. S18	14.55
Cleveland A7	14.55
Dover,O. G6	14.55
FranklinPark,Ill. T6	14.55
Harrison,N.J. C18	14.55
Indianapolis C8	14.70
Pawtucket,R.I. N8	14.90
Sharon,Pa. S3	14.55
Worcester,Mass. A7	14.85
Youngstown C8	14.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.00
Dearborn,Mich. D3	10.10
Dover,O. G6	10.10
Ecorse,Mich. G5	10.10
Ind.Harbor,Ind. Y1	10.20
Lackawanna,N.Y. B2	9.10
Sharon,Pa. S3	10.00

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	8.50	10.10	12.90	15.30	18.25
Boston T6	8.50	10.10	12.90	15.30	18.25
Bristol,Conn. W1	...	...	12.90	15.30	18.25
Carnegie,Pa. S18	...	9.80	12.60	15.00	...
Cleveland A7	7.95	9.80	12.60	15.00	17.95
Cleveland C7	...	9.80	12.60	15.00	17.95
Dover,O. G6	7.95	9.80	12.60	15.00	17.95
Detroit, D2	8.05	9.90	12.70	15.10	...
Dearborn,Mich. D3	8.05	9.90	12.70	...	...
FranklinPark,Ill. T6	8.05	9.80	12.60	15.00	17.95
Harrison,N.J. C18	...	...	12.90	15.30	18.25
Indianapolis C8	8.10	9.95	12.60	15.00	17.95
NewBritain Conn.(10) S15	7.95	9.80	12.60	15.00	17.95
NewCastle,Pa. B4, E5	7.95	9.80	12.60	15.00	...
NewHaven,Conn. D2	8.40	10.10	12.90	15.30	...
NewKensington,Pa. A6	7.95	9.80	12.60	15.00	...
NewYork W3	...	10.10	12.90	15.30	18.25
Pawtucket,R.I. N8	8.50	10.10	12.90	15.30	18.25
Riverdale,Ill. A1	8.05	9.80	12.60	15.00	17.95
Rome,N.Y. (32) R6	7.95	9.80	12.60	15.00	17.95
Sharon,Pa. S3	7.95	9.80	12.60	15.00	17.95
Trenton,N.J. R5	...	10.10	12.90	15.30	18.25
Wallingford,Conn. W2	8.40	10.10	12.90	15.30	18.15
Warren,O. T5	7.95	9.80	12.60	15.00	17.95
Weirton,W.Va. W6	7.95	9.80	12.60	15.00	17.95
Worcester,Mass. A7, T6	8.50	10.10	12.90	15.30	18.25
Youngstown C8	7.95	9.80	12.60	15.00	17.95

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	16.80	20.65	...
Buffalo W12	16.80	...	...
FranklinPark,Ill. T6	17.15	21.00	25.35
Harrison,N.J. C18	16.80	20.65	25.00
NewYork W3	16.80	20.65	25.00
Palmer,Mass. W12	16.80	...	...
Trenton,N.J. R5	16.80	20.65	25.00
Worcester,Mass. W12	14.80	...	...
Worcester,Mass. A7, T6	16.80	20.65	25.00
Youngstown C8	17.15	21.00	25.35

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	11.00	12.05	13.05
Brackenridge,Pa. A4	...	...	11.00	12.05	13.05
Mansfield,O. E6	9.20	10.35	11.00	12.05	13.05
Newport,Ky. N9	9.20	10.35	11.00	12.05	13.05
Niles,O. M21	9.20	10.35	11.00	12.05	...
Vandergrift,Pa. U5	...	10.35	11.00	12.05	13.05
Warren,O. R2	9.20	10.35	11.00	12.05	...
Zanesville,O. A10	...	10.35	11.00	12.05	13.05
Zanesville A10 (FP coils)	...	10.85	11.525	12.575	13.55
Zanesville A10 (SP coils)	...	...	11.025	12.075	13.05

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	...	11.525	12.575	13.55
GraniteCity,Ill. G4	9.40*	10.55*	11.225*†	12.275*	...
IndianaHarbor,Ind. I-2	9.20†	10.35*	11.025*†	12.075*	...
Mansfield,O. E6	9.70	10.85	11.525	12.575	13.55
Vandergrift,Pa. U5	9.20*	10.35*	11.025*†	12.075*	13.05*
Vandergrift,Pa. U5	...	10.85†	11.525††	12.575†	13.55†
Warren,O. R2	9.20*	10.85	11.525	12.575	13.55

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	14.05	14.60	15.10	16.15
Brackenridge,Pa. A4	14.05	...	...	...
Vandergrift,Pa. U5	14.05	14.60	15.10	16.15
Zanesville,O. A10	14.05	14.60	15.10	16.15

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	16.90	18.50	19.00	19.50	14.05**	
Butler Pa. A10	...	18.50	19.00	19.50	...	
Vandergrift,Pa. U5	15.90	16.90	18.50	19.00	19.50	14.55**
Warren,O. R2	...	...	...	...	...	14.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.30	$8.55	$8.95
Dravosburg,Pa. U5	8.30	8.55	8.95
Fairfield,Ala. T2	8.40	8.65	9.05
Fairless,Pa. U5	8.40	8.65	9.05
Fontana,Calif. K1	9.05	9.30	9.70
Gary,Ind. U5	8.30	8.55	8.95
GraniteCity,Ill. G4	8.40	8.65	9.05
IndianaHarbor,Ind. I-2, Y1	8.30	8.55	8.95
Niles,O. R2	8.30	8.55	8.95
Pittsburg,Calif. C11	9.05	9.30	9.70
SparrowsPoint,Md. B2	8.40	8.65	9.05
Weirton,W.Va. W6	8.30	8.55	8.95
Yorkville,O. W10	8.30	8.55	8.95

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.975	...	...
Niles,O. R2	6.975	7.175	7.375

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.60	$9.85
Dravosburg,Pa. U5	9.60	9.85
Fairfield,Ala. T2	9.70	9.95
Fairless,Pa. U5	9.70	9.95
Fontana,Calif. K1	10.35	10.60
Gary,Ind. U5	9.60	9.85
Ind.Harbor Y1	9.60	9.85
Pitts.,Calif. C11	10.35	10.60
Sp.Pt.,Md. B2	9.70	9.95
Weirton,W.Va. W6	9.60	9.85
Yorkville,O. W10	9.60	9.85

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$7.40
Dravosburg,Pa. U5	7.40
Fairfield,Ala. T2	7.50
Fairless,Pa. U5	7.50
Fontana,Calif. K1	8.15
Gary,Ind. U5	7.40
GraniteCity,Ill. G4	7.50
Ind.Harbor,Ind. I-2, Y1	7.40
Niles,O. R2	7.40
Pittsburg,Calif. C11	8.15
SparrowsPoint,Md. B2	7.50
Weirton,W.Va. W6	7.40
Yorkville,O. W10	7.40

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	$7.15
Gary,Ind. U5	7.15
GraniteCity,Ill. G4	7.25
Ind.Harbor,Ind. Y1	7.15
Yorkville,O. W10	7.15

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$9.10
Gary,Ind. U5	9.10
Yorkville,O. W10	9.10

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	$9.55

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$10.65

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	7.20
Aliquippa,Pa. J5	7.20
Alton,Ill. L1	7.40
Atlanta A11	7.40
Bartonville,Ill. K4	7.30
Buffalo W12	7.20
Chicago W13	7.20
Cleveland A7, C20	7.20
Crawfordsville,Ind. M8	7.30
Donora,Pa. A7	7.20
Duluth,Minn. A7	7.20
Fairfield,Ala. T2	7.20
Fostoria O.(24) S1	7.30
Houston 85	7.45
Jacksonville,Fla. M8	7.55
Johnstown,Pa. B2	7.20
Joliet,Ill. A7	7.20
KansasCity,Mo. 85	7.45
Kokomo,Ind. C16	7.30
LosAngeles B3	8.15
Minnequa,Colo. C10	7.45
Monessen,Pa. P7, P16	7.20
N.Tonawanda B11	7.20
Palmer,Mass. W12	7.50
Pittsburg,Calif. C11	8.15
Portsmouth,O. P12	7.20
Rankin,Pa. A7	7.20
S.Chicago,Ill. R2	7.20
S.SanFrancisco C10	8.15
SparrowsPoint,Md. B2	7.30
Sterling,Ill.(1) N15	7.20
Sterling,Ill. N15	7.30
Struthers,O. Y1	7.20
Waukegan Ill. A7	7.20
Worcester,Mass. A7	7.50

WIRE, M8 Spring, High Carbon

Aliquippa,Pa. J5	8.725
Alton,Ill. L1	8.925
Bartonville Ill. K4	8.825
Buffalo W12	8.725
Cleveland A7	8.725
Donora,Pa. A7	8.725
Duluth,Minn. A7	8.725
Fostoria,O. S1	8.775
Johnstown,Pa. B2	8.725
LosAngeles B3	9.675
Milbury,Mass.(12) N6	9.025
Minnequa,Colo. C10	8.975
Monessen,Pa. P7, P16	8.725
Muncie,Ind. I-7	8.925
Palmer,Mass. W12	9.025
Pittsburg,Calif. C11	9.675
Portsmouth,O. P12	8.725
Roebling,N.J. R5	9.025
S.Chicago,Ill. R2	8.725
S.SanFrancisco C10	9.675
SparrowsPt.,Md. B2	8.825
Struthers,O. Y1	8.725
Trenton,N.J. A7	9.025
Waukegan,Ill. A7	8.725
Worcester J4	9.025
Worcester,Mass. A7, T6	9.025

WIRE, Upholstery Spring

Aliquippa,Pa. J5	8.40
Alton Ill. L1	8.60
Buffalo W12	8.40
Cleveland A7	8.40
Donora,Pa. A7	8.40
Duluth,Minn. A7	8.40
Johnstown,Pa. B2	8.40
KansasCity,Mo. 85	8.65
LosAngeles B3	9.35
Minnequa,Colo. C10	8.60
Monessen,Pa. P7, P16	8.40
NewHaven,Conn. A7	8.70
Palmer,Mass. W12	8.70
Pittsburg,Calif. C11	9.35
Portsmouth,O. P12	8.40
Roebling,N.J. R5	8.70
S.Chicago,Ill. R2	8.40
S.SanFrancisco C10	9.35
SparrowsPoint,Md. B2	8.50
Struthers,O. Y1	8.40
Trenton,N.J. A7	8.70
Waukegan,Ill. A7	8.40
Worcester,Mass. A7	8.70

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	14.35
Bartonville,Ill. K4	14.25
Buffalo W12	14.15
Chicago W13	13.55
Cleveland A7	14.15
Crawfordsville,Ind. M8	14.25
Fostoria O. S1	14.15
Jacksonville,Fla. M8	14.50
Johnstown,Pa. B2	14.15
Kokomo,Ind. C16	14.15
Minnequa,Colo. C10	13.90
Monessen,Pa. P6	14.15
Muncie,Ind. I-7	14.35
Palmer,Mass. W12	14.45
Roebling,N.J. C10	14.45
S.SanFrancisco C10	14.50
Waukegan,Ill. A7	14.15
Worcester,Mass. A7, T6	14.45

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	11.75
Buffalo W12	11.75
Johnstown,Pa. B2	11.75
Minnequa,Colo. C10	11.875
Monessen,Pa. P16	11.75
Muncie,Ind. I-7	11.95
Palmer,Mass. W12	12.05
Pittsburg,Calif. C11	12.55
Portsmouth,O. P12	11.75
Roebling,N.J. R5	12.05
SparrowsPt.,Md. B2	11.85
Struthers,O. Y1	11.75

ROPE WIRE (A)

Bartonville,Ill. K4	11.55
Buffalo W12	11.55
Fostoria O. S1	11.55
Johnstown,Pa. B2	11.55
Monessen,Pa. P7, P16	11.55
Muncie,Ind. I-7	11.75
Palmer,Mass. W12	11.85
Portsmouth,O. P12	11.35
Roebling,N.J. R5	11.85
SparrowsPt. B2	11.65
Struthers,O. Y1	11.35
Worcester,Mass. J4	11.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE

WIRE, Tire Bead

Bartonville,Ill. K4	....15.25
Monessen,Pa. P16	....14.45
Roebling,N.J. R5	....14.35

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	....10.75
Baltimore T6	....11.05
Boston T6	....11.05
Buffalo W12	....10.75
Cleveland A7	....10.75
Crawfordsville,Ind. M8	10.75
Dover,O. G6	....10.75
Fostoria,O. S1	....10.75
FranklinPark,Ill. T6	....10.85
Kokomo,Ind. C16	....10.75
Massillon,O. R8	....10.75
Milwaukee C23	....10.95
Monessen,Pa. P7, P16	..10.75
NewKensington,Pa.	A6.10.75
Palmer,Mass. W12	....11.05
Pawtucket,R.I. N8	....11.05
Riverdale,Ill. A1	....10.85
Rome,N.Y. R6	....10.75
Trenton,N.J. R5	....11.05
Worcester A7, T6	....11.05

NAILS, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	..167
Aliquippa,Pa. J5	167
Atlanta A11	169
Bartonville,Ill. K4	169
Chicago,Ill. W13	167
Cleveland A9	173
Crawfordsville,Ind. M8	..169
Donora,Pa. A7	167
Duluth,Minn. A7	167
Fairfield,Ala. T2	167
Houston,Tex. S5	172
Jack'ville,Fla.(20) M8	..178
Johnstown,Pa. B2	169
Joliet,Ill. A7	167
KansasCity,Mo. S5	172
Kokomo,Ind. C16	169
Minnequa,Colo. C10	172
Monessen,Pa. P7	167
Pittsburg,Calif. C11	186
Rankin,Pa. A7	167
S.Chicago,Ill. R2	167
SparrowsPt.,Md. B2	169
Sterling,Ill.(1) N15	167
Worcester,Mass. A7	173
(To Wholesalers; per cwt)	
Galveston,Tex. D7	....8.75

NAILS, Cut (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	..$9.80
Wheeling,W.Va. W10	..9.80

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	..167
Aliquippa,Pa. J5	167
Atlanta A11	169
Bartonville,Ill. K4	169
Crawfordsville,Ind. M8	..169
Donora,Pa. A7	167
Duluth,Minn. A7	167
Fairfield,Ala. T2	167
Jack'ville,Fla.(20) M8	..178
Johnstown,Pa. B2	169
Joliet,Ill. A7	167
Kokomo,Ind. C16	169
Minnequa,Colo. C10	172
Monessen,Pa. P7	167
Pittsburg,Calif. C11	186
Rankin,Pa. A7	167
S.Chicago,Ill. R2	167
SparrowsPt.,Md. B2	169
Sterling,Ill.(1) N15	167
Worcester,Mass. A7	173

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity, Ala. R2	$10.03
Bartonville,Ill. K4	...10.13
Buffalo W12	....10.05
Crawfordsville,Ind. M8	.10.13
Donora,Pa. A7	....10.03
Duluth,Minn. A7	....10.03
Jacksonville,Fla. M8	..10.58
Johnstown, Pa. B2	....10.03
Joliet,Ill. A7	....10.03
Kokomo,Ind. C16	....10.13
LosAngeles B3	....10.82
Minnequa,Colo. C10	..10.28
Pittsburg,Calif. C11	..10.81
S.Chicago,Ill. R2	....10.03
S.SanFrancisco C10	....10.81
SparrowsPt.,Md. B2	....10.13
Sterling,Ill. N15	....10.03

Coil No. 4500 Stand.	
AlabamaCity,Ala. R2	.$10.35
Bartonville,Ill. K4	...10.45
Buffalo W12	....10.35
Crawfordsville,Ind. M8	10.45
Donora,Pa. A7	....10.35
Duluth,Minn. A7	....10.35
Jacksonville,Fla. M8	..10.91
Johnstown,Pa. B2	....10.35
Joliet,Ill. A7	....10.35
Kokomo,Ind. C16	....10.45
LosAngeles B3	....11.15
Minnequa,Colo. C10	..10.60
Pittsburg,Calif. C11	..11.15
S.Chicago,Ill. R2	....10.35
S.SanFrancisco C10	....11.15
SparrowsPt.,Md. B2	....10.45
Sterling,Ill. N15	....10.35

Coil Interim	
AlabamaCity,Ala. R2	.$10.40
Bartonville,Ill. K4	....10.50
Buffalo W12	....10.40
Crawfordsville,Ind. M8	10.50
Donora,Pa. A7	....10.40
Duluth,Minn. A7	....10.40
Jacksonville,Fla. M8	..10.96
Johnstown,Pa. B2	....10.40
Joliet,Ill. A7	....10.40
Kokomo,Ind. C16	....10.50
LosAngeles B3	....11.34
Minnequa,Colo. C10	..10.65
Pitts.,Calif. C11	....11.20
S.Chicago,Ill. R2	....10.40
S.SanFrancisco C10	....11.20
SparrowsPt.,Md. B2	....10.50
Sterling,Ill. N15	....10.40

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	.187••
Aliquippa,Pa. J5	....184‡
Atlanta A11	193
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	..193
Donora,Pa. A7	....187†
Duluth,Minn. A7	....187†
Fairfield,Ala. T2	....187†
Houston,Tex. S5	....192••
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	....191•
Joliet,Ill. A7	....187†
KansasCity,Mo. S5	....192••
Kokomo,Ind. C16	....189†
Minnequa,Colo. C10	....192••
Monessen,Pa. P7	....191•
Pittsburg,Calif. C11	....207†
Rankin,Pa. A7	....187†
S.Chicago,Ill. R2	....187••
S.SanFrancisco C10	....207••
SparrowsPoint,Md. B2	.193•
Sterling,Ill.(1) N15	....191•

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	.....181••
Aliq'ppa,Pa. 9-14½ga.J5	184‡
Atlanta A11	187
Bartonville,Ill. K4	187
Crawfordsville,Ind. M8	..187
Donora,Pa. A7	....181†
Duluth,Minn. A7	....181†
Fairfield,Ala. T2	....181†
Houston,Tex. S5	....186••
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	..185
Joliet,Ill. A7	....181†
KansasCity,Mo. S5	....186•†
Kokomo,Ind. C16	....182†
Minnequa,Colo. C10	....186••
Monessen,Pa. 9 ga. P7	185•
Pittsburg,Calif. C11	....204†
Rankin,Pa. A7	....181†
S.Chicago,Ill. R2	....181••
Sterling,Ill.(1) N15	....185•

	An'ld Galv.	Stone
WIRE (16 Gage)	**Stone**	
Ala.City R2	..16.10	17.65••
Bartonville K4	..16.10	18.05
Buffalo W12	....16.10	....
Cleveland A7	....16.10	....
Crawf'dsville M8	16.20	18.15
Fostoria,O. S1	..16.20	17.75†
Jacksonville M8	..16.45	18.40
Johnstown B2	..16.10	18.05•
Kokomo C16	..16.20	17.75†
Minnequa C10	..16.45	18.15••
P'lm'r,Mass.W12	16.10	17.65•
Pitts.,Calif. C11	16.45	18.00†
SparrowsPt. B2	16.20	18.15•
Sterling(1) N15	16.10	18.05•
Waukegan A7	..16.10	17.65
Worcester A7	....16.40	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	8.10 8.50••
Aliquippa J5	....8.10 8.625‡
Atlanta A11	....8.20 8.80
Bartonville(48) K4	8.20 8.80
Buffalo W12	....8.10 8.50†
Cleveland A7	....8.10 ....
Crawfordsville M8	8.20 8.80
Donora,Pa. A7	...8.10 8.50†
Duluth,Minn. A7	...8.10 8.50†
Fairfield T2	....8.10 8.50†
Houston(48) S5	.8.35 8.75••
Jacks'ville,Fla. M8	8.45 9.05
Johnstown B2(48)	8.10 8.70•
Joliet,Ill. A7	....8.10 8.50†
Kans.City(48) S5	.8.35 8.75••
Kokomo C16	....8.20 8.60†
LosAngeles B3	...9.05 9.65•
Minnequa C10	...8.35 8.75••
Monessen P7 (48)	8.10 8.70•
Palmer,Mass. W12	8.40 8.80†
Pitts.,Calif. C11	...9.05 9.45†
Portsmouth,O. P12	8.10 ....
Rankin,Pa. A7	...8.10 8.50†
S.Chicago R2	...8.10 8.50••
S.SanFran. C10	...9.05 9.45••
SparrwsPt. B2(48)	8.20 8.80•
Str'ling(1)(48) N15	8.10 8.70•
Struth'rs,O.(48) Y1	8.10 8.60‡
Worcester,Mass. A7	8.40 8.80†

Based on zinc price of: •13.50c. †5c. ‡10c. ‡‡Less than 10c. ††13c. ••Subject to zinc equalization extras.

BALE TIES, Single Loop Col.

AlabamaCity,Ala. R2	...195
Atlanta A11	197
Bartonville,Ill. K4	197
Crawfordsville,Ind. M8	..197
Donora,Pa. A7	195
Duluth,Minn. A7	195
Fairfield,Ala. T2	195
Jacksonville,Fla. M8	...202
Joliet,Ill. A7	195
Houston S5	200
KansasCity,Mo. S5	200
Kokomo,Ind. C16	197
Minnequa,Colo. C10	200
Pitts.,Calif. C11	199
S.Chicago,Ill. R2	167
Sterling,Ill. N15	167
Tonawanda,N.Y. B12	...169
Williamsport,Pa. S19	...175

FENCE POSTS

ChicagoHts.,Ill. C2, I-2	.167
Duluth,Minn. A7	167
Franklin,Pa. F5	167
Huntington,W.Va. W7	...169
Johnstown,Pa. B2	167
Marion,O. P11	157
Minnequa,Colo. C10	172
Moline,Ill. R2	172
S.Chicago,Ill. R2	167
Sterling,Ill. N15	167
Tonawanda,N.Y. B12	...169
Williamsport,Pa. S19	...175

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts

Full Size Body (cut thread)

½ in. and smaller:	
6 in. and shorter....	55
Longer than 6 in. ..	46.5
⅝ in. thru 1 in.:	
6 in. and shorter....	46.5
Longer than 6 in. ..	44
1⅛ in. and larger:	
All lengths	44

Undersized Body (rolled thread)

½ in. and smaller:	
6 in. and shorter...	55

Carriage, Machine Lag Bolts

Hot Galvanized:

½ in. and smaller:	
6 in. and shorter ...	35
Longer than 6 in. ..	23
⅝ in thru 1 in.:	
6 in. and shorter ..	20
Longer than 6 in. ..	20
1⅛ in. and larger:	
All lengths	20

Lag Bolts

All diameters:	
6 in. and shorter.....	55
Longer than 6 in.	47

Plow and Tap Bolts

½ in. and smaller by 6 in. and shorter	54
Larger than ½ in. or longer than 6 in.	47
Blank Bolts	47
Step, Elevator, Tire Bolts	54

NUTS

Reg. & Heavy Square Nuts:	
All sizes	59
Square Nuts, Reg. &	
Heavy, Hot Galvanized:	
All sizes	45

Hex Nuts, Reg. & Heavy, Hot Pressed:

⅝ in. and smaller..	63
⅞ in. to 1 in. incl..	59.5
1⅛ in. to 1½ in., incl.	64
1⅝ in. and larger...	58

Hex Nuts, Reg. & Heavy, Cold Punched:

⅝ in. and smaller..	63
⅞ in. to 1½ in., incl.	59.5
1⅝ in. and larger..	58

Hex Nuts, All Types, Hot Galvanized:

¾ in. and smaller..	50
⅞ in. to 1 in., incl.	46
1⅛ in. to 1½ in., incl.	51

Hex Nuts, Semifinished, Reg. & Heavy (Incl. slotted):

¾ in. and smaller..	63
⅞ in. to 1½ in., incl.	59.5
1⅝ in. and larger..	58

Hex Nuts, Finished (Incl. Slotted and Castellated):

1 in. and smaller...	65
1⅛ in. to 1½ in., incl.	62
1⅝ in. and larger..	58

(Base discounts, packages, per cent off list, f.o.b. mill)

CAP AND SET SCREWS

Hex Head Cap Screws, Coarse or Fine Thread Bright:

6 in. and shorter:	
⅝ in. and smaller..	47
¾, ⅞, and 1 in., diam.	31
Longer than 6 in.:	
⅝ in. and smaller..	18.5
¾, ⅞ and 1 in. diam.	55

High Carbon, Heat Treated:

6 in. and shorter:	
⅝ in. and smaller..	34
¾, ⅞ and 1 in. diam.	13
Longer than 6 in.:	
⅝ in. and smaller..	+1
¾, ⅞ and 1 in. diam.	+19

Fillister Head, Coarse Thread:

Listed Sizes	+31

Flat Head, Coarse Head:

¼ in. and smaller by 6 in. and shorter..	+57

Set Screws, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam.:	
6 in. and shorter ..	11
Longer than 6 in....	+10

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 10.85 ⅞-in. under List less 26.5%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. in.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	23.56	22.84
1¼	13	....	27.92	22.68
1½	13	26.34	30.86	25.08
1¾	13	31.12	36.45	29.64
2	13	34.88	40.85	33.21
2¼	13	39.29	46.01	37.42
2½	12	42.64	49.94	40.61
2¾	12	46.98	55.01	44.73
2¾	12	50.86	59.57	48.44
3	12	54.24	63.53	51.66

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Toe Rails All	Toe Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.075	4.975	5.025	6.00
Ensley,Ala. T2	5.075	4.975	....	6.00
Fairfield,Ala. T2	....	....	....	6.00
Gary,Ind. U5	5.075	4.975	5.025	....
Huntington,W.Va. W7	....	....	....	6.15
IndianaHarbor,Ind. I-2	5.075	4.975	5.025	....
Johnstown,Pa. B2	....	....	...(16)	6.00
Lackawanna,N.Y. B2	5.075	4.975	...(16)	6.00
Minnequa,Colo. C10	5.075	4.975	....	6.50
Steelton,Pa. B2	5.075	4.975	....	....
Williamsport,Pa. S19	....	....	....	6.15

TIE PLATES

Fairfield,Ala. T2	....6.025
Gary,Ind. U5	....6.025
Ind.Harbor,Ind. I-2	...6.025
Lackawanna,N.Y. B2	..6.025
Minnequa,Colo. C10	...6.025
Seattle B3	....6.175
Steelton,Pa. B2	....6.025
Torrance,Calif. C11	...6.175

TRACK BOLTS, Untreated

Cleveland R2	....13.10
Lebanon,Pa. B2	....13.10
Minnequa,Colo. C10	...13.10
Pittsburgh P14	....13.10
Seattle B3	....13.60

*Treated

AXLES

Ind.Harbor,Ind. S13	...8.10
Johnstown,Pa. B2	....8.10

JOINT BARS

Bessemer,Pa. U5	....6.35
Fairfield,Ala. T2	....6.35
Ind.Harbor,Ind. I-2	...6.35
Joliet,Ill. U5	....6.35
Lackawanna,N.Y. B2	..6.35
Minnequa,Colo. C10	...6.35
Steelton,Pa. B2	....6.35

SCREW SPIKES

Cleveland R2	....12.85
Pittsburgh P14	....12.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	....8.775
Ind.Harbor,Ind. I-2, Y1	8.775
KansasCity,Mo. S5	....8.775
Lebanon,Pa. B2	....8.775
Minnequa,Colo. C10	...8.775
Pittsburgh J5	....8.775
Seattle B3	....9.275
S.Chicago,Ill. R2	....8.775
Struthers,O. Y1	....8.775
Youngstown R2	....8.775

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.23c; 1 15/16 to 8 in., inclusive, 6.60c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.685c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝-in.; 7.55c. for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(38) 14 Ga. & Lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 8.65c, over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8
Ambridge, Pa. N2	+2	....	4.5	....	7	....	8.5	....	8.5	....	8.25	....	10.75	....
Lorain, O. N3	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8
Youngstown Y1	0.5	+17.5	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Alton, Ill. L1	....	....	....	....	....	....	10.5	+3.75	13.5	+4.75	16	+1.25	18.5	0.5
Benwood, W. Va. W10	10	+20.5	+0.25	+27.75	+9.75	+37.25	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Butler, Pa. F6	10	+20.5	0.5	+27	+8.5	+36	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Fairless, Pa. N3	....	....	....	....	....	....	10.5	+8.75	13.5	+4.75	16	+1.25	18.5	0.5
Fontana, Calif. K1	....	....	....	....	....	....	0	+19.25	3	+15.25	5.5	+11.75	8	+10
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	11.5	+7.75	14.5	+3.75	17	+0.25	19.5	1.5
Lorain, O. N3	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Sharon, Pa. S4	11	+19.5	1.5	+26	+7.5	+35	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Sparrows Pt., Md. B2	16	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Youngstown R2, Y1	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Alton, Ill. L1	19	1.5	19.5	2	21	2.75	21	2.75	....	....	....	....
Benwood, W. Va. W10	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+0.75	13.5	+5.25
Etna, Pa. N2	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25
Fairless, Pa. N3	19	1.5	19.5	2	21	2.75	21	2.75	11.5	+7.25	11.5	+7.25
Fontana, Calif. K1	8.5	+9	9	+8.5	10.5	+7.75	10.5	+7.75	1	+17.75	1	+17.75
Indiana Harbor, Ind. Y1	20	2.5	20.5	3	22	3.75	22	3.75	12.5	+6.25	12.5	+6.25
Lorain, O. N3	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Sharon, Pa. M6	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Youngstown R2, Y1	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	19.75	24.50	....	....	33.00	....	....	45.00	41.50	
202	21.00	27.25	33.00	....	35.75	....	39.25	41.25	45.25	45.25
301	20.50	25.25	33.75	....	34.00	38.50	40.50	42.50	47.25	43.75
302	22.00	28.00	34.00	....	36.75	38.75	40.75	43.00	47.50	47.50
302B	21.75	28.25	35.25	....	40.25	38.75	40.75	43.00	50.00	50.00
303	....	28.50	37.00	....	....	41.75	43.75	45.50	52.00	52.00
304	23.25	29.25	36.00	....	39.75	41.00	43.00	45.75	50.25	50.25
304L	....	....	43.00	....	46.75	48.50	50.50	53.25	57.75	57.75
305	24.75	32.50	37.75	....	43.00	41.00	43.00	46.25	53.50	53.50
308	26.75	34.00	42.50	....	45.50	48.25	50.50	55.00	57.50	57.50
309	34.75	44.00	51.50	....	58.50	57.75	60.50	64.25	73.50	73.50
310	42.50	53.75	69.00	....	75.50	77.75	81.50	83.25	87.00	87.00
314	....	....	....	....	....	77.75	....	83.25	....	....
316	35.25	44.50	56.25	....	63.50	63.75	66.75	70.25	74.75	74.75
316L	....	....	62.75	....	70.00	71.25	74.25	77.75	82.25	82.25
317	43.00	54.50	70.00	....	81.50	79.75	83.50	86.25	93.25	93.25
321	28.25	35.75	42.25	....	48.75	48.00	50.25	54.50	60.00	60.00
18-8CbTa	32.75	42.00	50.25	....	58.25	56.25	59.00	63.75	73.00	73.00
403	....	....	30.75	....	....	34.50	36.25	38.75	46.50	46.50
405	18.75	24.50	28.50	....	34.50	32.50	34.00	36.00	45.00	45.00
410	16.00	20.75	27.25	....	29.75	31.00	32.50	33.75	38.75	38.75
416	....	....	27.75	....	....	31.50	33.00	34.75	46.50	46.50
420	....	32.25	33.00	....	40.25	38.00	39.75	43.50	59.50	59.50
430	16.25	21.00	27.75	....	30.75	31.50	33.00	34.50	39.25	39.25
430F	....	....	28.25	....	....	32.00	33.50	35.25	49.75	49.75
431	....	27.25	35.50	....	....	39.75	41.75	43.50	53.00	53.00
446	....	....	37.75	....	56.75	42.75	44.75	46.00	67.25	80.00

Stainless Steel Producers Are. Allegheny Ludlum Steel Corp.; Alloy Metal Wire Div., H. K. Porter Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates, Carbon Base 10%	Plates, Carbon Base 20%	Sheets, Carbon Base 20%
302	....	....	33.25
304	34.50	41.50	35.25
304-L	37.20	44.65	....
316	38.70	46.65	52.25
316-L	45.70	54.35	....
316-CB	45.90	54.75	....
321	36.35	43.40	42.00
347	39.50	48.45	51.00
405	29.20	37.05	....
410	28.70	36.55	....
430	28.70	36.55	....
Inconel	52.50	68.45	....
Nickel	44.10	58.65	....
Nickel, Low Carbon	46.30	63.15	....
Monel	47.00	62.55	....
Copper*	....	....	46.00

	Strip, Carbon Base, Cold Rolled 10%	Strip, Carbon Base, Cold Rolled Both Sides
Copper*	33.60	41.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.290	Cr Hot Work	0.45-0.495
Extra Carbon	0.345	W-Cr Hot Work	0.043-0.475
Special Carbon	0.41-0.45	V-Cr Hot Work	0.460
Oil Hardening	0.450	Hi-Carbon-Cr	0.830

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	....	4.170
18.25	4.25	1	4.75	....	2.385
18	4	2	9	....	2.7575
18	4	2	....	....	1.845
18	4	1	....	....	1.680
9	3.5	..	....	....	1.275
13.5	4	3	....	....	1.945
13.75	3.75	2	5	....	2.325
6.4	4.5	1.9	....	5	1.185
6	4	3	....	6	1.430
1.5	4	1	....	8.5	1.040

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross tons, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	58.50	59.00	....	....
Birmingham R2	58.50	59.00‡	....	....
Birmingham U6	....	59.00‡	63.00	....
Woodward,Ala. W15	58.50	59.00‡	63.00	....
Cincinnati, deld.	....	66.70	....	....
Buffalo District				
Buffalo H1, R2	62.50	63.00	63.50	64.00
Tonawanda,N.Y. W12	62.50	63.00	63.50	64.00
N.Tonawanda,N.Y. T9	....	63.00	63.50	64.00
Boston, deld.	73.79	74.29	74.79	....
Rochester,N.Y., deld.	65.52	66.02	66.52	....
Syracuse,N.Y., deld.	66.62	67.12	67.62	....
Chicago District				
Chicago I-3	62.50	63.00	63.00	63.50
Gary,Ind. U5	62.50	....	63.00	....
S.Chicago,Ill. R2	62.50	....	63.00	....
S.Chicago,Ill. Y1	62.50	63.00	63.00	....
S.Chicago U5	62.50	....	63.00	63.50
S.Chicago,Ill. W14	62.50	....	63.00	63.50
Milwaukee deld.	64.80	65.30	65.30	65.80
Muskegon,Mich. deld.	....	69.68	69.68	....
Cleveland District				
Cleveland R2, A7	62.50	63.00	63.00	63.50
Akron,O., deld.	65.25	65.75	65.75	66.25
Mid-Atlantic District				
Bethlehem,Pa. B2	64.50	65.00	65.50	66.00
New York, deld.	....	69.01	69.51	....
Newark, deld.	67.70	68.20	68.70	69.20
Birdsboro,Pa. B10	64.50	65.00	65.50	66.00
Chester,Pa. P4	64.50	65.00	65.50	....
Philadelphia, deld.	66.26	66.76	67.26	....
Steelton,Pa. B2	64.50	65.00	65.50	66.00
Swedeland,Pa. A3	64.50	65.00	65.50	66.00
Philadelphia, deld.	66.26	66.76	67.26	67.76
Troy,N.Y. R2	64.50	65.00	65.50	66.00
Pittsburgh District				
NevilleIsland,Pa. P6	62.50	63.00	63.00	63.50
Pittsburgh (N&S sides), Aliquippa, deld.	....	64.45	64.45	64.95
McKeesRocks, deld.	....	64.10	64.10	64.63
Lawrenceville, Homestead, Wilmerding,Monaca, deld.	....	64.76	64.76	65.29
Verona,Trafford, deld.	64.79	65.32	65.32	65.85
Brackenridge, deld.	65.10	65.60	65.60	66.13
Bessemer,Pa. U5	62.50	....	63.00	63.50
Clairton,Rankin,S.Duquesne,Pa. U5	62.50	....	....	....
Midland,Pa. C18	62.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	63.00	....
Sharpsville,Pa. S6	62.50	....	63.00	63.50
Youngstown Y1	....	....	63.00	63.50
Mansfield,O. deld.	67.40	....	67.90	68.40
Duluth I-3	62.50	63.00	63.00	63.50
Erie,Pa. I-3	62.50	63.00	63.00	63.50
Everett,Mass. E1	63.25	63.75	64.25	....
Fontana,Calif. K1	70.00	70.50	....	....
Geneva,Utah C11	62.50	63.00	....	....
GraniteCity,Ill. G4	64.40	64.90	65.40	....
Ironton,Utah C11	62.50	63.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	64.50	65.00	65.50	....
Rockwood,Tenn. T3	....	59.00‡	63.00	....
Toledo,O. I-3	62.50	63.00	63.00	63.50
Cincinnati, deld.	68.26	68.76	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Phos. 0.70-0.90; intermediate (Phos. 0.31-0.50%), $60.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. I-3, J1	71.50
Buffalo H1	72.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon: add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Niagara Falls,N.Y. P15	$92.50
Keokuk,Iowa, Open-hearth & Fdry, freight allowed K2	102.00
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	105.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$76.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	76.50
Steelton,Pa. B2 (Phos. 0.035% max)	70.50
Philadelphia, deld.	74.05
Troy,N.Y. R2 (Phos. 0.035% max)	70.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	67.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, Spokane, 10 cents; Atlanta, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Merchant Qual.	H.R. Spec. Qual.	C.F. Rds.§	H.R. Alloy 4140††§		Carbon	Floor
Atlanta	8.07‖	9.27‖	9.83‖	....	8.16	8.30	...	10.14	....	8.44	8.40	10.22
Baltimore	7.79	8.99	9.12	....	8.27	8.34	8.87	9.09§	15.69	8.57	8.12	9.56
Birmingham	7.68‖	8.88‖	8.85‖	....	7.78	7.91	8.44	10.04	....	8.05	8.01	10.04
Boston	8.70	9.73	10.92	....	8.79	8.88	9.43	10.71	14.46	8.90	8.98	10.39
Buffalo	7.75	8.90	10.72	....	8.00	8.00	8.70	8.70	14.30	8.25	8.25	9.80
Chattanooga	7.90‖	9.10‖	9.10‖	....	8.00	8.13	8.66	9.96	....	8.27	8.23	9.98
Chicago	7.70	8.90	9.70	....	7.78	7.91	8.44	8.35	13.95	8.05	8.01	9.26
Cincinnati	7.82	8.89	9.70	....	8.06	8.19	8.72	8.82	14.23	8.55	8.34	9.53
Cleveland	7.68	8.88	9.60	....	7.88	7.99	8.52	8.60	14.03	8.38	8.21	9.46
Denver	9.55	11.09	12.41	....	9.70	9.75	...	10.54	18.89	9.60	9.50	11.15
Detroit	7.91	9.13	10.02	....	8.10	8.18	8.71	8.68	14.19	8.55	8.33	9.49
Erie, Pa.	7.75	8.88	9.60§§	....	7.90	8.00	8.65	8.70§§	....	8.35	8.20	9.50
Houston	8.70	9.65	10.99	....	8.80	8.95	9.50	10.70	15.00	9.40	9.10	10.60
Jackson, Miss.	8.00‖	9.20‖	9.22‖	....	8.10	8.23	8.76	10.14	....	8.37	8.33	10.08
Los Angeles	8.90	10.65	11.65	....	9.10	8.80	9.50	11.70	15.25	8.95	9.35	11.50
Milwaukee	7.82	9.02	9.82	....	7.90	8.03	8.56	8.57	14.07	8.24	8.13	9.37
Moline, Ill.	7.48	8.59	9.45	....	7.56	7.62	...	8.10	....	7.78	7.80	...
New York	8.35	9.53	10.23	57.73	8.81	8.83	9.38	10.61	14.37	8.74	8.78	10.06
Norfolk, Va.	7.85	...	...	....	8.30	8.35	...	10.80	....	8.60	8.10	9.60
Philadelphia	7.89	9.08	10.12	....	8.58	8.37	8.90	9.12	14.15	8.38	8.28	9.37
Pittsburgh	7.68	8.88	10.05	50.00	7.88	7.91	8.44	8.60	13.95	8.05	8.01	9.26
Portland, Oreg.	8.95	9.65	11.40	....	9.05	8.95	...	13.55	14.60	8.90	8.70	11.60
Richmond, Va.	8.05	...	10.09	....	8.45	8.70	9.20	10.00	....	8.80	8.35	9.70
St. Louis	8.02	9.21	10.03	....	8.11	8.25	8.78	8.93	14.28	8.48	8.34	9.59
St. Paul	7.83	8.78	9.80	....	7.91	7.97	...	8.70	....	8.13	8.15	9.42
San Francisco	8.75	10.30	10.80	....	8.95	8.80	9.35	12.30	15.25	8.85	8.85	11.15
Seattle	9.35	11.20	11.55	....	9.50	9.30	9.85	13.15	15.55	9.15	9.05	11.25
Spokane, Wash.	9.35	11.35	11.55	....	9.50	9.30	9.85	13.15	16.30	9.15	9.05	11.25
Washington	8.31	10.43	...	....	8.99	8.74	...	9.90	....	9.02	8.64	11.10

*Prices do not include gage extras; †prices include gage and coating extras (based on 12.50c zinc at Los Angeles and 13.50c at other points), except in Birmingham (coating extra excluded); ‡includes 35-cent bar quality extras; **¼-in. and heavier; ††as annealed; ‖42 in. and under.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 6000 lb except in Chicago, New York and Boston, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; §—400 to 999 lb; §§—1000 to 1999 lb; §—2000 to 3999 lb; §§—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $128; Salina, Pa., $133; Niles, O., $138; Cutler, Utah, $148.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $165; Stevens Pottery, Ga., $175.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, O., Hawstone, Pa., $140; Warren, Niles, Windham, O., Hays, Latrobe, Morrisville, Pa., $145; E. Chicago, Ind., Joliet, Rockdale, Ill., $150; Lehigh, Utah, $165; Los Angeles, $170.

Super-Duty: Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $157; Morrisville, Latrobe, Pa., $160; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $145; Woodbridge, N. J., $128; Philadelphia, $130.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, O., $96; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., $220; Danville, Ill., $223; Philadelphia, Clearfield, Pa., $230.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $275; Danville, Ill., $278; Philadelphia, Clearfield, Pa., $285.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $315; Danville, Ill., $318; Philadelphia, Clearfield, Pa., $325.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $177; Clearfield, Pa., $189.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $292; Clearfield, Pa., $311.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $221; Clearfield, Pa., $236.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Nario, O., $16; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ⅛-in. grains with fines: Chewelah, Wash., $43; Luning, Nev., $43; ⅜-in. grains with fines: Baltimore, $69.40.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-39; 70%, $35-36; 60%, $31-32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross tons, 51.50% iron natural, rail of vessel, lower lake ports.)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.00
Mesabi nonbessemer	10.85
Open-hearth lump	12.10
High phos	10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	25.00
N. African hematite (spot)	nom. 24.00-25.00
Brazilian iron ore 68-69%	33.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$32.50-33.00
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, contracts, nominally $1.35-1.40, per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47% $1.10-1.15. Spot cargoes, 10 to 15% higher.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 3:1	$52.00-53.50
48% 2.8:1	nom. 49.00-50.00
48% no ratio	39.00-40.00

South African Transvaal

48% no ratio	$35.00-36.00
44% no ratio	25.00-26.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked $1.18

Antimony Ore

Per unit of lb content, c.i.f. seaboard

55-60%	$3.35-3.80
60-65%	3.80-3.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge iron:	
Swedish, c.i.f., Camden, N.J., c.l. in bags	8.50
Domestic:	
F.o.b., Johnstown, Pa., Niagara Falls, N. Y., in bags	9.50
F.o.b. Riverton, N.J., in bags	8.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	24.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+ % Fe)	34.00
Unannealed (99+ % Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron:	
98.1-99.9%, 3 to 20 microns, depending on grade, 86.00-275.00, in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500 lb, drum frght, allowed	
Carlots	36.20
Ton lots	38.20
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	38.50-48.25†
Bronze, 5000-lb lots	59.50-63.00†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	58.00-61.00†
Phosphor-Copper, 5000-lb lots	65.00
Silicon	47.50
Solder	7.00*
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50*
Zinc 5000-lb lots	19.75-33.00‡

Tungsten:	Dollars
Melting grade, 99%	
60 to 200 mesh:	
1000 lb and over	4.50
Less than 1000 lb	4.65
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25

CARBON

8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.25-14.75
Connellsville, foundry	17.00-18.00

Oven Foundry Coke

Birmingham, ovens	$27.60
Cincinnati, deld.	32.53
Buffalo, ovens	29.50
Camden, N. J., ovens	28.50
Detroit, ovens	29.50
Pontiac, deld.	31.15
Saginaw, deld.	32.73
Erie, Pa., ovens	27.50
Everett, Mass., ovens	
New England, deld.	30.55*
Indianapolis, ovens	28.75
Ironton, O., ovens	28.00
Cincinnati, deld.	28.25
Kearny, N. J., ovens	28.75
Lone Star, Tex., ovens	19.50
Milwaukee, ovens	29.50
Neville Island (Pittsburgh), Pa., ovens	28.25
Painesville, O., ovens	29.50
Cleveland, deld.	31.55
Philadelphia, ovens	28.50
St. Louis, ovens	28.50
St. Paul, ovens	28.50
Chicago, deld.	31.82
Swedeland, Pa. ovens	28.50
Terre Haute, Ind., ovens	28.75

*Or within $4.55 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$7.30	$7.30	$7.30	$7.70
Bar Size Angles	7.11	7.11	7.11	7.51
Structural Angles	7.50	7.50	7.50	7.90
I-Beams	7.75	7.75	7.75	8.15
Plates	9.55	9.55	9.55	9.95
Sheets, H.R.	8.75	8.75	8.75	9.15
Sheets, C.R. (drawing quality)	9.10	9.10	9.10	9.45
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	27.02	27.02	27.02	30.98
Barbed Wire (†)	6.71	6.71	6.71	7.06
Merchant Bars	7.30	7.30	7.30	7.70
Hot-Rolled Bands	7.50	7.50	7.50	7.90
Wire Rods, Thomas Commercial No. 5	6.50	6.50	6.50	6.90
Wire Rods, O-H Cold Heading Quality No. 5	6.90	6.90	6.90	7.30
Bright Common Wire Nails	8.05	8.05	8.05	8.35

Oil Country Pipe: Mills withdrawn for remainder of the year.

†Per 82-lb. net, reel. §Per 100-lb kegs, 20d nails and heavier

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Cariot, per gross ton, Palmerton, Pa. 21-23% Mn, $98.50; 19-21% Mn, 1-3% Si, $96; 16-19% Mn, $94.00.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $235. Duquesne, Johnstown, Sheridian, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $223 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump bulk, max. 0.07% C, 33.75c per lb of contained Mn, carload packed 35.05c, ton lots 36.55c, less ton 37.75c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 24.15c per lb of contained Mn, packed, carload 25.45c, ton lot 27.05c, less ton 28.25c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 33c; 2000 lb to min carload, 35c; 500 lb to 1999 lb 37c; 50 lb cans, 37.5c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.95c per lb of alloy. Packed, c.l. 14.15c, ton 14.60c, less ton 15.6c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract ton lot 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 27.75c per lb of contained Cr; c.l. packed 29.3c, ton lot 31.05c; less ton 32.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 34.75c per lb contained Cr, 0.02% max 41.5c, 0.03% max 41c, 0.06% max 39.5c, 0.1% max 39c 0.15% max 38.75c, 0.2% max 38.5c, 0.5% max 38.25c, 1.0% max 37.5c, 1.5% max 37.35c, 2.0% max 37.25c. Ton lot, add 3.4c, less ton add 5.1c. Carload packed add 1.75c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7% Si 7-10%). Contract, c.l. 2 in. x D, bulk 29.05c per lb contained Cr. Packed, c.l. 30.65c, ton 32.45c, less ton 33.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 20.85c, per lb of alloy, ton lot 22.10c; less ton lot 23.3c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload lump, 4" x down and 2" x down, bulk, 41.35c per lb of contained Cr; 1" x down, bulk 42.35c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, cariot, packed 2" x D plate (about ¼" thick) $1.29 per lb, ton lots $1.31; less ton lots $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max., C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Sped Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed, 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si. Packed, c.l. 16c, ton lot 17.45c, less ton 19.1c. F.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk 15.25c per pound contained silicon. Packed, c.l. 17.25c, ton lot, 19.05c; less ton, 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%; Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing 2 lb of Cr). Contract, carload, bulk, 19c per lb of briquet, carload packed in box pallets 19.2c, in bags 20.1c; 3000 lb to c.l. in box pallets 22.2c; 2000 lb to c.l. in bags, 21.3c; less than 2000 lb in bags 20.40c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 13.9c per lb of briquet, c.l. packed, pallets 14.1c, bags 15.11c; 3000 lb to c.l., pallets 15.3c; 2000 lb to c.l. bags 16.3c, less ton 17.2c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3⅛ lb and containing 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 14.4c per lb of briquet, c.l. packed, pallets, 14.6c; bags 15.6c, 3000 lb to c.l., pallets, 15.8c; 2000 lb to c.l., bags 16.8c; less ton 17.7c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.55c per lb of briquet; packed, pallets, 7.75c; bags 8.75c; 3000 lb to c.l., pallets 9.35c; 2000 lb to c.l. bags 10.35c; less ton 11.25c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.9c; bags 8.9c; 3000 lb to c.l. pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $4.95 per lb of contained Cb plus Ta, delivered; less ton lots $5.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½-in. x 12 M, 19c per lb of alloy, ton lots 20.15c, less ton 21.4c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

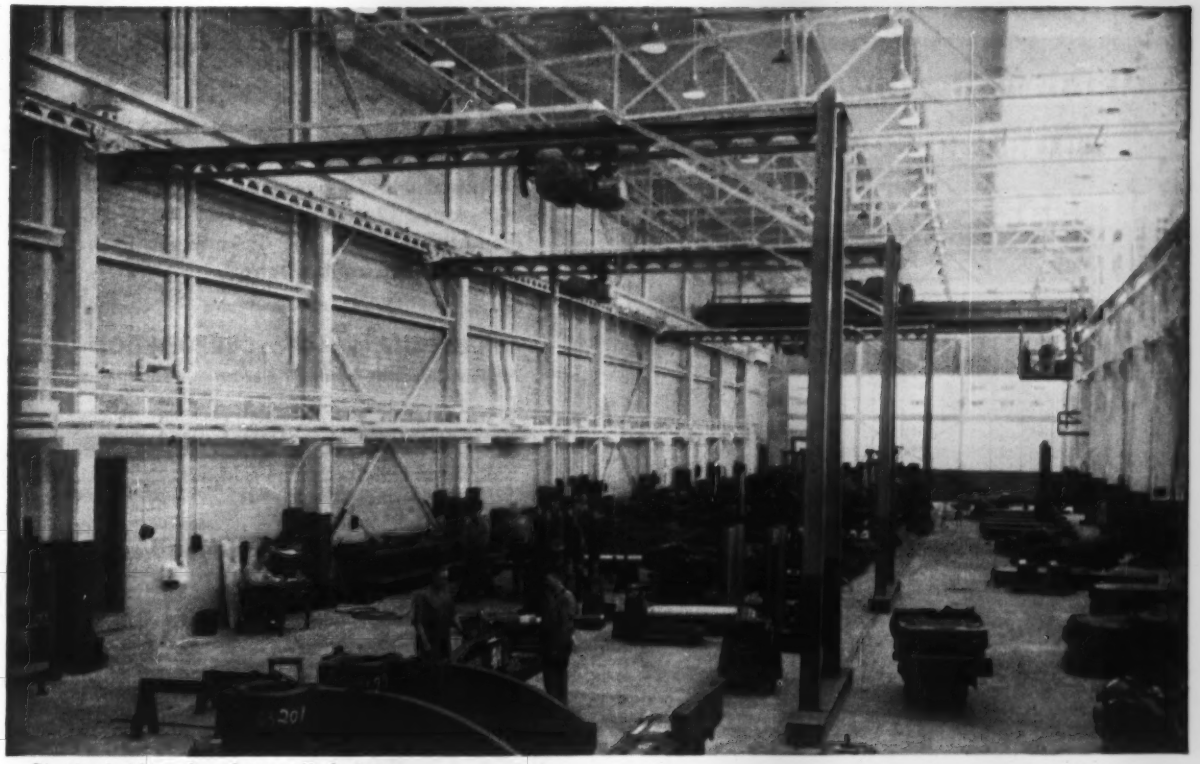
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 2000 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

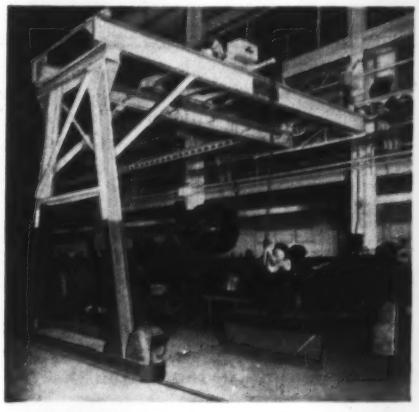
Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, and Washington, Pa., $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.



Single bridge, hand-propelled gantries with electric hoists operating under heavy overhead crane in a machine tool plant.



Double girder, completely motorized gantry. Because gantries ride on a floor rail and one wall rail, their use often eliminates need of long span overhead cranes.

GANTRY CRANES BOOST PRODUCTION

IT is not unusual for skilled workers to wait 5 or 10 minutes and more in many shops for crane service. By providing a sufficient number of gantry cranes, much or all of this lost time can be eliminated and production aided.

Efficiency usually can be greatly improved by providing one large overhead crane for each shop bay — for the heavy lifting and transportation from one end of bay to the other — and a number of gantries to work under it, to do the light local or spot handling.

Several Cleveland Tramrail gantries generally can be purchased for the price of a large overhead crane and are available for manual or electric operation.

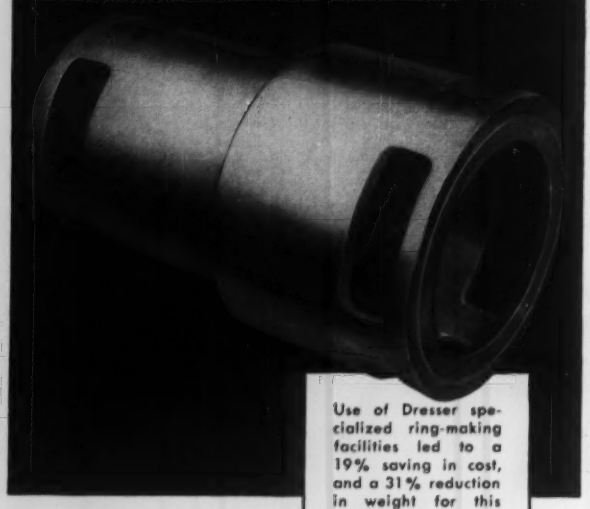
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7809 EAST 284TH STREET, WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Machining practically eliminated with DRESSER WELDMENTS



Use of Dresser specialized ring-making facilities led to a 19% saving in cost, and a 31% reduction in weight for this generator frame.

If you can visualize your product as a combination of circular shapes, you may be in a position to produce a better product at less cost.

A generator frame, for example, used to be laboriously hogged out of a heavy cast cylinder to proper thickness and contours. Dresser now supplies complete frames made of four accurately formed and welded steel rings. Two rings are steel, of low magnetic permeability; two are mild steel. Machining is all but eliminated.

You can save machining time, speed production and cut scrap losses, too, by using Dresser Weldments. Send for catalog number 56-S. No obligation.

Typical Dresser Weldments

- *Rings and Cylinders*—circular elements may also be combined into composite weldment.
- *Hot-Formed Circular Parts* — extensive banks of presses and furnaces offer you economies in volume production.
- *Shafts or Circular Parts Welded from Dissimilar Metals* — available with a portion of the part resistant to heat, corrosion or abrasion—or provided with greater strength or hard surface in a localized section.

We'll gladly make recommendations at no cost to you. Just send us your sketch or print.

ONE OF THE DRESSER INDUSTRIES

DRESSER WELDMENTS

Dresser Manufacturing Division

118 FISHER AVENUE • BRADFORD, PA.

STRUCTURAL STEEL BUILDING FOR SALE

20,000 square foot building, riveted, covered with asbestos corrugated sheeting, equipped with (2) overhead electric traveling cranes, 2 ton and 5 ton, AC & DC, respectively, 405 feet of runway. Easily dismantled. Location Detroit.

Wire—Phone—Write

INDUSTRIAL PLANTS CORPORATION

90 West Broadway BArclay 7-4185 New York 7, N. Y.

BROWNING ELECTRIC TRAVELING CRANES AND HOISTS

up to 125-TON CAPACITY

VICTOR R. BROWNING & CO., INC. WILLOUGHBY (Cleveland), OHIO

famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 22-42 Barclay Street, New Haven, Conn.
Pacific Coast Representative: *A. C. Berbringer, Inc., 334 N. San Pedro St., Los Angeles, California.* Canada: *P. P. Barber Machinery Co., Toronto, Canada.*

If METALWORKING PLANTS ARE YOUR PROSPECTS . . .

✓ STEEL can put you in touch with the important ones, those that do more

✓ than 92% of the industry's business.

✓ Tell the buyers and specifiers in these plants of the machines or materials you have for sale through an "Equipment—Materials" advertisement. For rates write STEEL, Penton Building, Cleveland 13, Ohio.

Heavy Volume of Scrap Moving

Consumers are taking in substantial tonnage on old orders but are placing few new orders. Prices hold at recently established levels, pending developments

Scrap Prices, Page 170

Philadelphia—Increases in steel scrap prices are noted for railroad specialties and rail crops, both grades being up $2. Other grades are firm but unchanged, with the movement of tonnage heavy. Export demand is more active. One vessel has cleared and another is due for loading shortly.

Pittsburgh—In the absence of representative sales the past week, the scrap market here is steady, with prices firm and unchanged on the major steelmaking grades. No. 1 heavy melting is quoted at $58-$59, the level at which the last representative mill buy was made. The railroad grades are up $1 to $3 a ton based on the latest lists.

Boston—Steel scrap shipments are active, but, generally, they are at unchanged prices. Turnings and borings and short shoveling steel tend to edge upward. For export, No. 1 heavy melting steel commands the same price as that for district shipment, $51.50, but No. 2 steel and bundles are $2 to $3 higher, dock, than the domestic delivery.

New York—The scrap market is steady here. Incoming material is being received in substantial quantities, and prices appear to have found a plateau. Some grades are up $1 a ton here, but this is more of an adjustment than a reflection of increased demand.

Chicago — The influx of scrap into the mills in this area has been so high that they are reported to be policing the flow, telling brokers how many cars they can handle daily. Prices remain firm, but the feeling prevails that a decline may be coming soon.

Washington — Full-scale steelmaking operations into 1957 as-

(*Please turn to page* 176)

WHY YOU'LL LIKE TO STAY AT
The Lord Baltimore HOTEL

In downtown Baltimore . . . within walking distance of nearly every place you'll want to go. Teletype: BA263.

COWLES
TRIMMING KNIVES
produce more tonnage per grind
Cowles knives stay on the job longer. They keep mills in continuous production without downtime for knife changes. Manufactured from individually hammered forgings, and heat treated to assure maximum durability, they meet industry's most exacting requirements. Complete range of sizes. Prompt delivery. Widely used by all principal producers and processors. Let us quote on your requirements!

COWLES
TOOL COMPANY
2086 WEST 110th STREET
CLEVELAND 2, OHIO
Specializing in the Manufacture of
ROTARY SLITTING KNIVES • SPACING COLLARS • GANG TOOLS • EDGING ROLLS • CUT-OFF KNIVES • SEAM GUIDE ROLL FINS • SEAM GUIDES • WIRE DRAWING TOOLS • STANDARD AND SPECIALLY ENGINEERED TOOLS FOR ALL FERROUS AND NON-FERROUS PROCESSING, TRIMMING AND FORMING REQUIREMENTS.

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Sept. 19	$59.67
Sept. 12	59.67
Aug. Avg.	57.13
Sept. 1955	44.42
Sept. 1951	44.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	58.00-59.00
No. 2 heavy melting	51.00-52.00
No. 1 bundles	58.00-59.00
No. 2 bundles	47.00-48.00
No. 1 busheling	58.00-59.00
Machine shop turnings	39.00-40.00
Mixed borings, turnings	39.00-40.00
Short shovel turnings	43.00-44.00
Cast iron borings	43.00-44.00
Cut structurals, 3 ft lengths	67.00-68.00
Heavy turnings	53.00-54.00
Punchings & plate scrap	67.00-68.00
Electric furnace bundles	67.00-68.00

Cast Iron Grades

No. 1 cupola	54.00-55.00
Heavy breakable cast	*49.00-50.00*
Unstripped motor blocks	36.00-37.00
No. 1 machinery cast	58.00-59.00

Railroad Scrap

No. 1 R.R. heavy melt.	*68.00-69.00*
Rails, 2 ft and under	*78.00-79.00*
Rails, 18 in. and under	*79.00-80.00*
Rails, random lengths	*75.00-76.00*
Railroad specialties	74.00-75.00

Stainless Steel Scrap

18-8 bundles & solids	395.00-405.00
18-8 turnings	275.00-290.00
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	62.50-63.50
No. 2 heavy melting	44.00-45.00
No. 1 bundles	62.50-63.50
No. 2 bundles	40.00-41.00
No. 1 busheling	62.50-63.50
Machine shop turnings	32.50-33.50
Mixed borings, turnings	36.50-37.50
Short shovel turnings	36.50-37.50
Cast iron borings	36.50-37.50
Low phos.	62.50-63.50
Cut structural plates 2 ft and under	68.00-69.00
Alloy free, short shovel turnings	43.00-44.00
Electric furnace bundles	62.50-63.50

Cast Iron Grades

No. 1 cupola	57.00-58.00
Charging box cast	50.00-51.00
Heavy breakable cast	48.00-49.00
Stove plate	54.00-55.00
Unstripped motor blocks	36.00-37.00
Brake shoes	44.00-45.00
Clean auto cast	56.00-57.00
Burnt cast	43.00-44.00
Drop broken machinery	59.00-60.00

Railroad Scrap

No. 1 R.R. heavy melt.	65.00-66.00
R.R. malleable	70.00-71.00
Rails, 2 ft and under	83.00-84.00
Rails, 18 in. and under	84.00-85.00
Rails, random lengths	80.00-81.00
Cast steel	69.00-70.00
Railroad specialties	74.00-75.00
Uncut tires	73.00-74.00
Angles, splice bars	75.00-76.00
Rails, rerolling	82.00-83.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	380.00-390.00
18-8 turnings	250.00-260.00
430 clips, bundles, solids	100.00-110.00
430 turnings	50.00-60.00

YOUNGSTOWN

No. 1 heavy melting	65.00-66.00
No. 2 heavy melting	47.00-48.00
No. 1 bundles	65.00-66.00
No. 2 bundles	43.00-44.00
No. 1 busheling	65.00-66.00
Machine shop turnings	34.00-35.00
Short shovel turnings	38.00-39.00
Cast iron borings	38.00-39.00
Low phos.	65.00-66.00
Electric furnace bundles	65.00-66.00

Railroad Scrap

No. 1 R.R. heavy melt.	66.00-67.00

CHICAGO

No. 1 heavy melting	61.00-62.00
No. 2 heavy melting	47.00-48.00
No. 1 factory bundles	64.00-65.00
No. 1 dealer bundles	*59.00-60.00*
No. 2 bundles	43.00-44.00
No. 1 busheling	56.00-57.00
Machine shop turnings	*38.00-39.00*
Mixed borings, turnings	*38.00-39.00*
Short shovel turnings	*38.00-39.00*
Cast iron borings	*38.00-39.00*
Cut structurals, 3 ft	66.00-67.00
Punchings & plate scrap	67.00-68.00

Cast Iron Grades

No. 1 cupola	53.00-54.00
Stove plate	47.00-48.00
Unstripped motor blocks	41.00-42.00
Clean auto cast	57.00-58.00
Drop broken machinery	57.00-58.00

Railroad Scrap

No. 1 R.R. heavy melt.	65.00-66.00
R.R. malleable	71.00-72.00
Rails, 2 ft and under	82.00-83.00
Rails, 18 in. and under	82.00-83.00
Angles, splice bars	73.00-74.00
Rails, rerolling	84.00-85.00

Stainless Steel Scrap

18-8 bundles & solids	450.00-470.00
18-8 turnings	350.00-379.00
430 bundles & solids	70.00-75.00
430 turnings	52.50-57.50

DETROIT

Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	55.00
No. 2 heavy melting	43.00
No. 1 bundles	56.00
No. 2 bundles	39.00
No. 1 busheling	55.00
Machine shop turnings	30.00
Mixed borings, turnings	33.00
Short shovel turnings	34.00
Punchings & plate scrap	60.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	41.00
Stove plate	42.00
Heavy breakable	41.00
Unstripped motor blocks	32.00
Clean auto cast	53.00
Malleable	52.00

BIRMINGHAM

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	42.00-43.00
No. 2 bundles	34.00-35.00
No. 1 busheling	42.00-43.00
Cast iron borings	25.00-26.00
Short shovel turnings	*32.50-33.50*
Machine shop turnings	*30.50-31.50*
Bar crops and plate	*58.00-59.00*
Structural & plate, 2 ft.	*57.00-58.00*
Electric furnace bundles	*53.00-54.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	51.00-52.00
Stove plate	49.00-50.00
Unstripped motor blocks	44.00-45.00
Charging box cast	40.00-41.00
No. 1 wheels	43.00-44.00

Railroad Scrap

No. 1 R.R. heavy melt.	50.00-51.00
Rails, 18-in. and under	71.00-72.00
Rails, rerolling	*72.00-73.00*
Rails, random lengths	65.00-66.00
Angles, splice bars	64.00-65.00

PHILADELPHIA

No. 1 heavy melting	59.00
No. 2 heavy melting	50.00
No. 1 bundles	59.00
No. 2 bundles	49.00
No. 1 busheling	59.00
Electric furnace bundles	61.00
Mixed borings, turnings	41.00
Machine shop turnings	41.00
Short shovel turnings	45.00
Heavy turnings	54.00
Structurals & plates	62.00-63.00
Couplers, springs, wheels	*70.00*
Rail crops, 2 ft & under	*76.00-77.00*

Cast Iron Grades

No. 1 cupola	53.00-55.00
Malleable	68.00
Heavy breakable cast	56.00-57.00
Drop broken machinery	58.00-59.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*53.00-54.00*
No. 2 heavy melting	*43.00-44.00*
No. 1 bundles	*53.00-54.00*
No. 2 bundles	*42.00-43.00*
Machine shop turnings	*32.00-33.00*
Mixed borings, turnings	*31.00-32.00*
Short shovel turnings	*37.00-38.00*
Low phos. (structural & plate)	*54.00-55.00*

Cast Iron Grades

No. 1 cupola	46.00-47.00
Unstripped motor blocks	36.00-37.00
Heavy breakable	48.00-48.50

Stainless Steel

18-8 sheets, clips, solids	350.00-360.00
18-8 borings, turnings	190.00-200.00
430 sheets, clips, solids	115.00-120.00
410 sheets, clips, solids	105.00-110.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	51.00-51.50
No. 2 heavy melting	41.00-42.00
No. 1 bundles	51.00-51.50
No. 2 bundles	37.50-38.00
No. 1 busheling	51.00-51.50
Machine shop turnings	29.00-30.00
Mixed borings, turnings	31.00-32.00
Short shovel turnings	33.00-34.00
No. 1 cast	44.00-44.50
Mixed cupola cast	39.50-40.00
No. 1 machinery cast	45.50-46.00

BUFFALO

No. 1 heavy melting	56.00-57.00
No. 2 heavy melting	*45.00-46.00*
No. 1 bundles	56.00-57.00
No. 2 bundles	*42.00-43.00*
No. 1 busheling	56.00-57.00
Mixed borings, turnings	34.00-35.00
Machine shop turnings	31.00-32.00
Short shovel turnings	35.00-36.00
Cast iron borings	34.00-35.00
Low phos.	60.00-61.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.00-48.00
No. 1 machinery	53.00-54.00

Railroad Scrap

Rails, random lengths	*71.00-72.00*
Rails, 3 ft and under	*77.00-78.00*
Railroad specialties	*68.00-69.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	57.00-58.00
No. 2 heavy melting	*46.00-47.00*
No. 1 bundles	57.00-58.00
No. 2 bundles	*43.00-44.00*
No. 1 busheling	57.00-58.00
Machine shop turnings	35.50-36.50
Mixed borings, turnings	37.00-38.00
Short shovel turnings	40.00-41.00
Cast iron borings	37.00-38.00
Low phos., 18 in.	62.00-63.00

Railroad Scrap

No. 1 cupola	48.00-49.00
Heavy breakable cast	47.00-48.00
Charging box cast	48.00-49.00
Drop broken machinery	58.00-59.00

Railroad Scrap

No. 1 R.R. heavy melt.	62.00-63.00
Rails 18 in. and under	77.00-78.00
Rails random lengths	68.00-69.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	53.00
No. 2 heavy melting	45.00
No. 1 bundles	53.00
No. 2 bundles	41.00
No. 1 busheling	53.00
Machine shop turnings	*32.00*
Short shovel turnings	36.00

Cast Iron Grades

No. 1 cupola	50.00
Charging box cast	44.00
Heavy breakable cast	44.00
Unstripped motor blocks	*44.00*
Brake shoes	51.00
Clean auto cast	54.00
Stove plate	45.50

Railroad Scrap

No. 1 R.R. heavy melt.	63.50
Rails, 18 in. and under	*82.00*
Rails, rerolling	*88.00*
Rails, random lengths	77.00
Angles, splice bars	70.00

SEATTLE

No. 1 heavy melting	50.00
No. 2 heavy melting	46.00
No. 1 bundles	42.00
No. 2 bundles	31.00
Machine shop turnings	25.00-27.00
Mixed borings, turnings	25.00-27.00
Electric furnace No. 1	58.00-60.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Heavy breakable cast	42.00-44.00
No. 1 wheels	37.00
Unstripped motor blocks	44.00
Stove plate (f.o.b. plant)	35.00-37.00

LOS ANGELES

No. 1 heavy melting	44.00
No. 2 heavy melting	40.00
No. 1 bundles	43.00
No. 2 bundles	33.00
Machine shop turnings	25.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*46.00*

SAN FRANCISCO

No. 1 heavy melting	50.00
No. 2 heavy melting	47.00
No. 1 bundles	48.00
No. 2 bundles	42.00
Machine shop turnings	30.00
Mixed borings, turnings	30.00
Cast iron borings	30.00
Heavy turnings	30.00
Short shovel turnings	33.00
Cut structurals	58.00

Cast Iron Grades

No. 1 cupola	55.00
Charging box cast	45.00-47.00
Stove plate	48.00
Heavy breakable cast	42.00
Unstripped motor blocks	47.00
Clean auto cast	55.00
No. 1 wheels	45.00-47.00
Drop broken machinery	55.00

HAMILTON, ONT.

No. 1 heavy melting	52.00
No. 2 heavy melting	47.00
No. 1 bundles	52.00
No. 2 bundles	42.50
Mixed steel scrap	46.00
Buseling, new factory: Prepared	50.00
Unprepared	46.00
Short steel turnings	34.00

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b., Hamilton, Ont.

Leaders in Iron & Steel Scrap Since 1889

For over half a century our experience, personnel, equipment and key office locations have contributed to the steady growth of the iron and steel industry. Possibly our facilities may help you solve a problem in iron or steel scrap—no matter how big or small.

Luria Brothers and Company, Inc.

main office PHILADELPHIA NATIONAL BANK BUILDING, *Phila. 7, Pa.*

PLANTS

LEBANON, PENNA. DETROIT (HAMTRAMCK), MICHIGAN
READING, PENNA. PITTSBURGH, PENNA.
MORGANZA, PENNA. ERIE, PENNA.

OFFICES

BIRMINGHAM, ALA. CLEVELAND, OHIO LOS ANGELES, CAL. READING, PENNA.
BOSTON, MASS. DETROIT, MICHIGAN NEW YORK, N. Y. ST. LOUIS, MISSOURI
BUFFALO, N. Y. HOUSTON, TEXAS PITTSBURGH, PENNA. SAN FRANCISCO, CAL.
CHICAGO, ILLINOIS LEBANON, PENNA. PUEBLO, COLORADO SEATTLE, WASH.
MONTREAL, CANADA

IMPORT & EXPORT — LIVINGSTON & SOUTHARD, INC., 70 Pine St., New York 5, N. Y. — Cable address — FORSHIPCO

Sales Lag Expectations

While the market tone is firm, slow automotive demand is causing some disappointment in nonferrous circles. Suez crisis sends tin prices soaring

Nonferrous Metal Prices, Pages 174 & 175

MOTORDOM'S deferral of orders is causing September sales of some nonferrous metals to be slower than expected.

Zinc — Most large producers report that domestic shipments in September will be at about the same level as August's (70,709 tons). Detroit is letting out orders for zinc diecastings in a trickle rather than the expected flood. Sales for galvanizing are holding at satisfactory levels, but producers admit that diecasting sales are disappointing. No one is pessimistic.

Aluminum—Everyone is expecting orders from Detroit; few have received them, reports one aluminum spokesman. Sales continue to show added strength, but there are growing indications that supply and demand are in balance. The use of more aluminum on new model cars will help assure the metal a record fourth quarter.

Copper — Sales are satisfactory to good. Copper wire and cable producers continue to add stability to the market. Custom smelters, selling at 39 cents a pound, report that sales are picking up. Copper and brass mill shipments continue to improve. The Motor City is holding back orders and deferring others, but another week or two should see Detroit "pulling out the stops."

While primary producers are still pricing copper at 40 cents a pound, they are having little difficulty selling available production. Primary producers are having better sales than secondary producers as users continue to protect positions with primary metal companies.

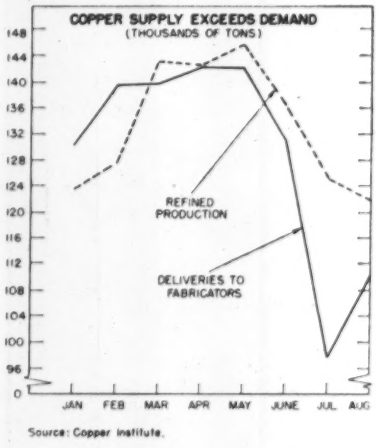
Copper notes: 1. Foreign demand in the last 10 days, reports one producer, has exceeded the domestic interest. 2. World refined production reached 242,319 tons in August, reports the Copper Institute. World deliveries to fabricators totaled 224,890 tons. U. S. refined production in August continued to outrun deliveries to fabricators (see chart). Refined stocks at the beginning of September showed an increase, rising from 87,944 tons on Aug. 1 to 96,450 tons.

Tin in Quandary

Domestic tin prices have soared to about the $1.06 per pound level. Cause: Suez tension.

Some people are pointing out an alternate way to get tin to the U. S. without going through the Suez (and at about the same price). It can be (and in some cases is) shipped by way of the Pacific and the Panama canal. It takes 38 to 42 days, the same time needed to ship from Singapore through the Suez. But ships normally want to ship through the Suez so they can make several stops along the Mediterranean.

There are fewer opportunities to deliver cargo on the Pacific route. Outlook: 1. Ships could come via the Pacific or Cape of Good Hope, but prices might jump from 15 to 25 per cent. 2. The only delay in deliveries would come when ships already dispatched for the Suez might be rerouted in case user nations decide to boycott the waterway in Egypt.



Source: Copper Institute.

Mag Bounces Back

Primary production of magnesium was riddled by strikes in July (down to 1136 tons), but it jumped back to better than 3000 tons in August, according to estimates. Fourth quarter production will be slightly over 6000 tons a month (industry capacity) which means some 68,000 tons of the metal will be made this year.

Market Memo

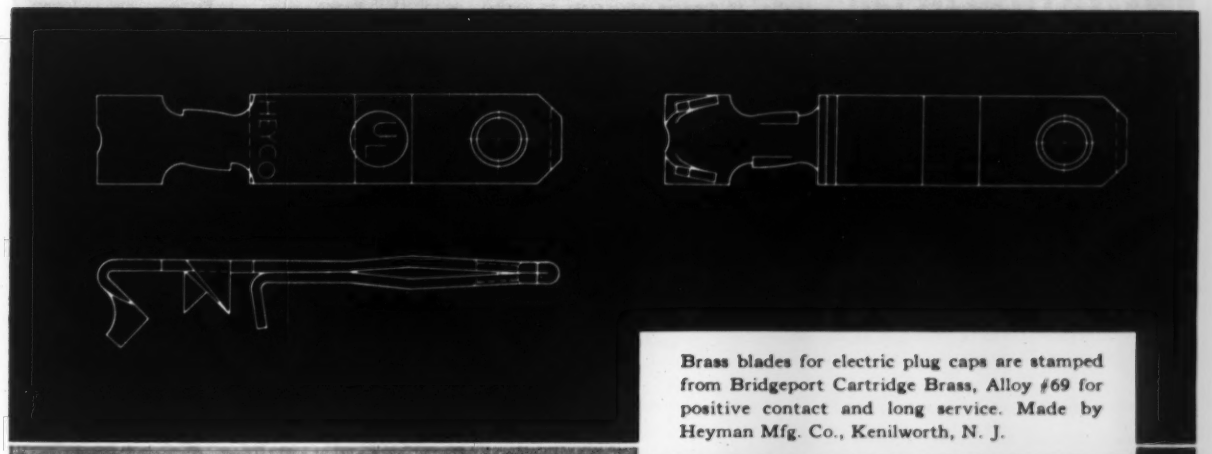
• Titanium, columbium - tantalum and tungsten may be in line for new expansion goals from the Office of Defense Mobilization. The one for titanium could be announced by the end of the month.

NONFERROUS PRICE RECORD

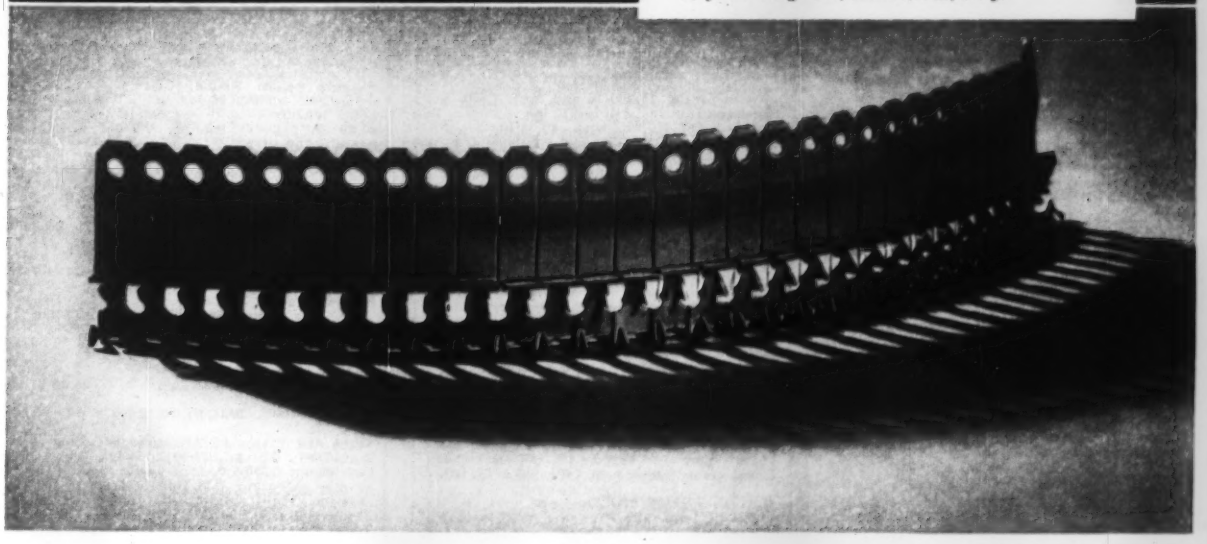
	Price Sept. 19	Last Change		Previous Price	Aug. Avg.	July Avg.	Sept., 1955 Avg.
Copper	39.00-40.00	Aug.	22, 1956	39.50-40.00	39.750	40.030	45.380
Lead	15.80	Jan.	13, 1956	16.30	15.800	15.800	14.920
Zinc	13.50	Jan.	6, 1956	13.00	13.500	13.500	12.940
Tin	105.75	Sept.	18, 1956	106.50	99.043	96.435	96.565
Nickel	64.50	Nov.	24, 1954	60.00	64.500	64.500	64.500
Aluminum ..	27.10	Aug.	10, 1956	25.90	26.700	25.900	24.400
Magnesium .	35.25	Aug.	13, 1956	33.75	34.694	33.750	32.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

Matching metal to job with Bridgeport alloys



Brass blades for electric plug caps are stamped from Bridgeport Cartridge Brass, Alloy #69 for positive contact and long service. Made by Heyman Mfg. Co., Kenilworth, N. J.



For fast, close-tolerance stamping and forming specify Bridgeport HIGH I.Q.* Strip

Stamping brass plug blades like these on special presses with multiple station dies calls for the right combination of methods and material. The material used must have exact temper and ductility for clean cuts and accurate forming and bending through 180°. That's why Bridgeport Alloy #69 was specified—it was *matched* to the job, for manufacturing requirements as well as for the finished product.

Stamped or machined—there's a Bridgeport High I.Q.* Alloy that will help you cut production costs and produce a better product. Call your nearest Bridgeport Sales Office today. They'll give you the metal that's *job-matched* to your requirements.

**High Inner Quality*

Bridgeport Brass Co.

BRIDGEPORT BRASS

Offices in Principal Cities • Conveniently Located Warehouses

Bridgeport Brass Company, Bridgeport 2, Connecticut • In Canada: Noranda Copper and Brass Limited, Montreal

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 27.10; pigs, 25.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 28.90; No. 43, 28.70; No. 195, 30.30; No. 214, 30.50; No. 356, 28.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 40.00 deld. Conn. valley; 40.00 deld. Midwest; custom smelters, 39.00 deld.; lake, 40.00 deld.; fire refined, 39.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $90-$110 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 98 + %, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 35.25; ingot, 36.00, f.o.b. Velasco, Tex. 13 in. sticks, 59.00, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91B (diecasting), 37.25 deld.; AZ63A, AZ92A, AZ91C (sand castings), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $255-$257 per 76-lb flask.

Molybdenum: Extruded ingot, $9.60 per pound, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100 per troy oz, nom.

Palladium: $23-$24 per troy oz.

Platinum: $103-$108 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.00 per lb.

Silver: Open market, 90.75 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot, 105.75; prompt, 105.625.

Titanium: Sponge, 99.3 + %, grade A-1 ductile (0.3% Fe max), $3.00; grade A-2 (0.5% Fe max), $2.70 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom, f.o.b. shipping point; less than 1000 lb, add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.

Zinc: Prime Western, 14.00; brass special, 14.25; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $10.00 per lb; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.00-27.75; No. 12 foundry alloy (No. 2 grade), 26.50; 5% silicon alloy, 0.60 Cu max, 28.00-28.25; 13 alloy, 0.60 cu max, 28.00-28.25; 195 alloy, 28.00-28.75; 108 alloy, 26.50-27.00. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 26.25; grade 2, 25.50; grade 3, 24.75; grade 4, 24.25.

Brass Ingot: Red brass, No. 115, 37.55; tin bronze, No. 225, 48.00; No. 245, 43.50; high-leaded tin bronze, No. 305, 41.00; No. 1 yellow, No. 405, 29.75; manganese bronze, No. 421, 33.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 37.50; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nominal 1.9% Be alloy) Strip, $1.86-$1.91, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.88, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 45.355; l.c.l., 45.98. Weatherproof, 30,000-lb lots, 43.78; l.c.l., 44.53. Magnet wire deld., 15,000 lb or more, 52.68; l.c.l., 53.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheet and strip, $12.10-$13.00; sheared mill plate, $10.50-$12.00; wire, $9.50-$11.50; forging billets, $7.25-$7.50; hot-rolled and forged bars, $7.55-$7.80.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 24.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $20.35; H.R. strip, $23.95; C.R. strip, $32.00; forged or H.R. bars, $18.40; wire, 0.015 in., 8.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets C.R.	113	97	118
Strip, C.R.	111	99	128
Plate, H.R.	107	96	111
Rod, Shapes, H.R.	94	80	99
Seamless Tubes	144	120	190

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam.(in.)or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	74.30	71.50	....	....
0.156-0.172	63.00	60.40	....	....
0.188	63.00	60.40	....	76.40
0.219-0.234	59.70	57.20	....	....
0.250-0.281	59.70	57.20	....	73.00
0.313	59.70	57.20	....	69.60
0.344	58.50	....	....	....
Cold-finished				
0.375-0.547	58.80	57.50	70.10	65.50
0.563-0.688	58.80	57.50	66.70	61.60
0.750-1.000	57.40	56.00	61.00	58.10
1.063	57.40	56.00	....	56.10
1.125-1.500	55.20	53.90	59.00	56.10
Rolled				
1.563	53.70	52.40	....	....
1.625-2.000	53.10	51.60	....	....
2.125-2.500	51.70	50.30	....	....
2.563-3.375	50.20	48.70	....	....

ALUMINUM (continued)

Sheets and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range, Inches	Flat Sheet	Coiled Sheet
0.249-0.136	40.90-45.40	....
0.135-0.096	41.40-46.50	37.70-39.60
0.095-0.077	42.10-48.30	37.80-39.80
0.076-0.061	42.70-50.60	38.20-40.50
0.060-0.048	43.40-52.90	38.80-41.50
0.047-0.038	43.90-55.60	39.60-42.90
0.037-0.030	44.30-50.00	40.40-44.70
0.029-0.024	44.90-52.40	41.0c
0.023-0.019	45.80-52.20	42.00
0.018-0.017	46.60-53.30	42.60
0.016-0.015	47.50-53.90	43.40
0.014	48.50-50.90	44.40
0.013-0.012	49.70-52.10	45.10
0.011	50.70-53.70	46.30
0.010-0.0095	52.10-54.40	47.60
0.009-0.0085	53.40	49.10
0.008-0.0075	55.00	50.03
0.007	56.50	51.80
0.006	58.10	53.20

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	40.2	44.5
5050-F	41.3	45.6
3004-F	42.3	47.5
5052-F	42.9	48.2
6061-T6	44.4	50.0
2024-T4*	48.1	54.4
7075-T6*	55.4	62.5

*24-48 in. widths or diam, 72-180 lengths.

Forging Stock: Round, Class 1, 43.30-55.90 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 48.10-63.20 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size(in.)		Nom. Pipe Size(in.)	
⅜	$18.45	2	$ 57.00
1	29.00	4	157.20
1¼	39.25	6	281.65
1½	46.95	8	423.80

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.90-47.50	61.50-65.80
12-14	46.20-47.70	62.20-66.80
15-17	46.40-48.30	63.50-68.50
18-20	47.00-48.80	65.50-71.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; 0.81 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.0, 93.30. Tread plate, .188 in., 71.70; .250-2.0 in., 70.60. Tooling plate, .250-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots) **Aluminum:** 1100 clippings, 17.00-18.00; old sheets, 14.00-14.50; borings and turnings, 8.00-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tube
Copper	61.63b	58.86c	....	61.82
Yellow Brass	52.10	42.65d	52.64	55.01
Low Brass, 80%	55.85	55.79	56.39	58.66
Red Brass, 85%	57.19	57.13	57.73	60.00
Com. Bronze, 90%	59.08	59.02	59.62	61.64
Manganese Bronze	59.46	53.56	63.80	....
Muntz Bronze	53.84	49.65	....	....
Naval Brass	55.72	50.03	62.78	58.88
Silicon Bronze	65.22	64.41	65.26	67.26e
Nickel Silver, 10%	67.76	70.09g	70.09	....
Phos. Bronze, A, 5%	79.58	80.08	81.26	36.250

SCRAP ALLOWANCES f

	Clean Heavy	Rod Ends	Clean Turnings
Copper	36.000	36.000	35.250
Yellow Brass	27.250	27.000	25.125
Low Brass, 80%	30.625	30.375	29.875
Red Brass, 85%	31.875	31.625	31.125
Com. Bronze, 90%	33.125	32.875	32.375
Manganese Bronze	25.250	25.000	24.500
Muntz Bronze	25.625	25.375	24.875
Naval Brass	25.250	25.000	24.500
Silicon Bronze	35.000	34.750	34.000
Nickel Silver, 10%	32.750	32.500	16.375
Phos. Bronze, A, 5%	36.250	36.000	35.000

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20 000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

9.00; crankcases, 14.00-14.50; industrial castings, 14.00-14.50.

Copper and Brass: No. 1 heavy copper and wire, 30.25-30.75; No. 2 heavy copper and wire, 28.75-29.50; light copper, 26.25-26.75; No. 1 composition red brass, 25.50-26.00; No. 1 composition turnings, 25.00-25.50; yellow brass turnings, 15.00-15.50; new brass clippings, 23.50-24.00; light brass, 14.50-15.00; heavy yellow brass, 16.50-17.00; new brass rod ends, 21.00-21.50; auto radiators, unsweated, 19.50-20.00; cocks and faucets, 19.50-20.00; brass pipe, 20.50-21.00.

Lead: Heavy, 12.50-13.00; battery plates, 7.00-7.25; linotype and stereotype, 13.50-14.00; electrotype, 12.50-13.00; mixed babbitt, 13.50-14.00.

Monel: Clippings, 80.00-90.00; old sheets, 70.00-80.00; turnings, 70.00-80.00; rods, 80.00-90.00.

Nickel: Sheets and clips, 130.00-195.00; rolled anodes, 130.00-195.00; turnings, 110.00-165.00; rod ends, 130.00-195.00.

Zinc: Old zinc, 4.50-5.50; new die-cast scrap, 4.00-4.50; old die-cast scrap, 2.50-3.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 20.00-20.50; 3003 clippings, 20.00-20.25; 6151 clippings, 20.00-20.25; 5052 clippings, 20.-20.25; 2014 clippings, 19.00-20.00; 2017 clippings, 19.00-20.00; 2024 clippings, 19.00-20.00; mixed clippings, 19.00; old sheets, 17.50; old cast, 17.50; clean old cable (free of steel), 19.25-20.00; borings and turnings, 17.00-18.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 62.00; light scrap, 57.00; turnings and borings, 42.00.

Copper and Brass: No. 1 heavy copper and wire, 33.00; No. 2 heavy copper and wire, 31.50; light copper, 29.25; refinery brass (60% copper) per dry copper content, 30.75.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 33.00; No. 2 heavy copper and wire, 31.50; light copper, 29.25; No. 1 composition borings, 29.00; No. 1 composition solids, 28.50; heavy yellow brass solids, 20.00; yellow brass turnings, 19.00; radiators, 22.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 58.29; oval, 57.54, 5000-10,000 lb; electrodeposited, 50.28; 2000-5000 lb lots; cast, 52.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 10-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. Prices eastern delivery.

Tin: Bar or slab; less than 200 lb, 125.50; 200-499 lb, 124.00; 500-999 lb, 123.50; 1000 lb or more, 123.00.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 30.25, over 10,000 lb, 29.50.

Copper Cyanide: 100-1000 lb, 80.50.

Copper Sulphate: 500-1900 lb, 21.15; 2000 lb and over, 18.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 43.50; 400-4900 lb, 41.50; 5000-9900 lb, 39.50; 10,000 lb and over, 38.50. Prices eastern delivery.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36 000 lb, 30.35. Prices eastern delivery.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 74.80; 100-600 lb, 66.10; 700-1900 lb, 63.60; 2000-9900 lb, 61.90; 10 000 lb or more, 60.70.

Stannous Chloride (anhydrous): Less than 25 lb, 172.60; 25 lb, 137.60; 100 lb, 122.60; 400 lb, 120.20; 5200-19,600 lb, 108.00; 20,000 lb or more, 95.80.

Stannous Sulphate: Less than 50 lb, 135.10; 50 lb, 105.10; 100-1900 lb, 103.10; 2000 lb or more, 101.10.

Zinc Cyanide: Under 1000 lb, 55.55; 1000 lb and over, 53.55.

FURNACE ENGINEER
(EXPORT)

A new and challenging position in our company; requires considerable furnace engineering experience and administrative ability. Position entails handling of inquiries from European Licensees and consists of proposal engineering rather than detail design. Successful applicant will be located in our new plant and offices in suburban Philadelphia. Send resumes to

Personnel Director
SELAS CORPORATION OF AMERICA
Dresher, Pa.
(Near Philadelphia)

CAREER OPPORTUNITIES

With one of the most substantial and oldest producers of ferro-alloys for the iron and steel industry.

GENERAL TECHNICAL ASSISTANT — Sound metallurgical education and wide knowledge of metallurgical processes and industries is essential. Experience in some phase of the steel industry is desirable, and research experience would be particularly valuable. Should have a thorough knowledge of library science as the result of specialized education or research experience. Work requires an ability to write fluently and accurately.

TECHNICAL FILE ADMINISTRATOR — Sound metallurgical education is essential. Should have a knowledge of library science through specialized education or research experience. Should have knowledge of a wide range of metallurgical processes and familiarity with the metals industry. Must have the ability to write accurately and fluently.

METALLURGIST OR METALLURGICAL ENGINEER—For field development work on use of alloys in electric steel melting and high temperature alloys. B.S. Degree, several years experience and moderate travel is required.

SALARY: Commensurate with qualifications and past experience.

Please send resume, present salary, and salary requirements to:
Box 461, STEEL
Penton Bldg. Cleveland 13, Ohio

FOR CLASSIFIED RATES
And Further Information write
STEEL, Penton Bldg., Cleveland 13, O.

TECHNICAL SERVICE REPRESENTATIVE

•

Top national company, major supplier to metals-producing industry, requires mature man with sales sense, capable of discussing technical matters with customer management, supervisory and operating personnel in the field, and possessing ability to handle technical reports and correspondence. Attractive salary commensurate with experience and progress.

Engineering degree or comparable experience necessary. Knowledge of metal production processes, particularly electric arc or blast furnaces, desirable, but not absolutely essential.

Location New York City. Permanent position for right man. Submit resume and personal data to Box 468, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANT TO BUY
STEEL BY-PRODUCT DISCS

2" To 2½" DIAMETER	.060 TO .125
4⅛" DIAMETER	.060 TO .125
6⅛" TO 10" DIAMETER	.060 TO .125
11½" OR 12⅝" DIAMETER	.085 TO .095

HOT OR COLD ROLLED

CONTACT PURCHASING DEPARTMENT
KEYSTONE LAMP MFG. CORP.
SLATINGTON, PA.,
PHONE: SLATINGTON P. O. 7-3821

CLASSIFIED ADVERTISING

Opportunities

EUROPEAN MANUFACTURER OF EXCEPTIONALLY efficient high pressure packaged steam generators, from 15 to 500 HP, offers U. S. license. Can supply highly developed technical assistance. Write Leon G. Rucquoi, Technical and Economic Consultant, 30 Rockefeller Plaza, New York 20, N. Y.

WE CAN HELP YOU TO CONTACT high calibre men to fill specific jobs you have in mind—
Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry.
When you have an opportunity to offer, use the Help Wanted columns of STEEL.

Help Wanted

PITTSBURGH DISTRICT STEEL PLANT wants several men, not over 40 years of age, with 10 or more years of practical open hearth operating experience who have the education and potential for rapid advancement to melters, general foremen, or assistant superintendent. Salary open—write giving full details of age, experience, salary desired, and why you think you are qualified for a more responsible supervisory position. All replies treated in strict confidence. Reply Box 469, STEEL, Penton Bldg., Cleveland 13, Ohio.

SUPERVISOR FOR MAINTENANCE MACHINE shop for cold rolling specialty mill. Mechanical Engineering degree desirable but not necessary. Write furnishing resume of experience, education and salary expected to Box 467, STEEL, Penton Bldg., Cleveland 13, Ohio.

(*Concluded from page 169*)

sure continued consumption of purchased scrap at about 3.5 million gross tons monthly, according to Edwin C. Barringer, executive vice president, Institute of Scrap Iron & Steel Inc. This monthly tonnage, along with annual exports of 4.5 million to 5 million gross tons, indicates that purchased scrap (including prompt industrial material) is being generated at an annual rate of about 45 million gross tons.

Buffalo — Secondary grades of steel scrap advanced $2 a ton here with the placing of new orders by the leading district consumer. The mill paid $46 for No. 2 heavy melting, and $43 for No. 2 bundles. No. 1 heavy melting is unchanged at $57, but the market is firm in this and other primary grades.

Certain railroad grades advanced sharply as a result of the strong market and tight supplies. Random length rails are $72, while rail crops are selling up to $78. Railroad specialties advanced to $69.

Cleveland—A heavy tonnage of scrap is moving to consumers on old contracts, but no new buying is reported. Prices are unchanged at levels established early this month. Auto lists at the end of this month are expected to offer 30 per cent more production scrap than they did a month ago. The outcome of bidding on these lists will have much to do with the immediate trend of prices in the market generally.

Cincinnati — Some softening in the No. 2 grades is reflected, with brokers quoting No. 2 heavy melting at $46-$47, off $1. No. 2 bundles are down $1 to $43-$44. No. 1 heavy melting continues firm at $57-$58.

Birmingham — Electric furnace scrap is quoted $1 to $2 a ton higher in a fairly active market. An Atlanta purchaser of heavy melting returned to the market with a purchase of No. 2 material at an increase of $3 a ton, delivered. The order is being filled from nearby yards.

Higher export prices are drawing most of the scrap in coastal areas.

Los Angeles—Prices on No. 1 cupola cast, fluctuating between $46 and $50, have settled at the lower figure. The market maintains its uncertain undertone.

St. Louis — Demand for all grades of scrap is steady here. Supply is described as fair, with some grades scarce. Mills are not turning away any offerings. Railroad material is in short supply. This has resulted in a rise of $2 on rails 18 in. and under and rerolling rails.

Seattle—Scrap is firm at the higher levels established two weeks ago. Receipts are heavy. Domestic consumers are buying in volume, and exports continue large.

Activity in full cargo chartering from Atlantic and North Pacific ports continues at high levels. From this coast to Japan a typical charter for about 9000 tons is $190,000, free load and discharge. During the month several ships were taken on this basis.

From Atlantic or Gulf ports prevailing rates range from $200,000 to $267,000, based on size and type of carrier. Gulf to west coast of Italy, full cargoes were closed around $195,000.

Scrap from Peru to Japan is quoted at $20 a ton, free load and discharge. A similar rate has been paid for ore from Peru to Japan, while ore from Campbell river, British Columbia, to Japan was done at $13 a ton, free in and out.

Iron Ore . . .

Iron Ore Prices, Page 165

Lake vessel operators are making every effort to cut the 13,500,000-ton deficit in the 1956 navigation season's ore movement resulting from the steel and vessel strikes this summer. In the week ended Sept. 17, the fleet moved 3,252,527 tons, tops for the year, and one of the biggest seven-day hauls since 3,371,697 tons were shipped in mid-September, 1953.

Last week's tonnage, which topped that of the like week in 1955 by 300,000 tons, brought the 1956 cumulative total to 48,631,618 tons, against 61,855,164 tons on Sept. 17 a year ago.

Stocks of iron ore on hand at U. S. and Canadian docks and furnaces on June 30 totaled 39,484,652 gross tons, reports the Lake Superior Iron Ore Association. This compares with 31,621,394 tons on May 31.

Of the total stocks, 29,965,742 tons were U. S. Lake Superior ores: 2,620,610 tons, other U. S. ores; 869,281 tons, Canadian Lake Superior ores; 2,320,856 tons, other Canadian ores; 3,708,163 tons, foreign ores.

Consumption of iron ore in June amounted to 10,575,249 tons, bringing the total for the first six months of the year to 67,414,087 tons.

June consumption breaks down as follows: U. S. Lake Superior ore, 6,911,684 tons; other U. S. ores, 1,419,974; Canadian Lake Superior ores, 282,554; other Canadian ores, 723,127; imported ores, 1,237,910 tons.

In the first six months consumption was: U. S. Lake Superior ores, 44,147,877 tons; other U. S. ores, 9,993,866; Canadian Lake Superior ores, 1,789,358; other Canadian ores, 3,303,320; foreign ores (Canada excepted), 8,179,666 tons.

New lake shipping rates have been established on iron ore and coal as a result of contracts entered into by a large Great Lakes vessel operator with several large shippers. The rates on iron ore are effective from Sept. 1 to Nov. 30 this year, from Sept. 15 to Nov. 30 on coal.

The iron ore rates are: $1.90 per gross ton from the head of Lake Superior to lower lake ports; $1.71, Marquette to lower lake ports; $1.425, Escanaba to Lake Erie.

The coal rates, per net ton, are 75 cents to the head of Lake Superior, and 89 cents to Milwaukee.

Movement of iron ore from northern Quebec to the Great Lakes this year is far ahead of that in 1955. The Iron Ore Co. of Canada says that by the end of the navigation season, four ships will have hauled out 225 per cent of the over-all 1955 movement.

The figures show that 1,769,000 tons have been moved from Seven Islands to Contrecoeur, the company's upriver trans-shipment base. Up to this time in 1955, only 685,000 tons had been moved over the route. A total of 1,101,000 tons was shipped out of Seven Islands for Contrecoeur during the entire 1955 navigation season. By the end of the current season, it is estimated that 2,250,000 tons will have been moved.

The 1956 tonnage will exceed company estimates by some 250,000 tons.

Advertising Index

Aetna-Standard Engineering Co., The ..... Inside Back Cover
Allis-Chalmers ..... Inside Front Cover, 55, 56
American Brake Shoe Co., Denison Engineering Division 43
American Brass Co., The 148
American Chain & Cable 100
American Monorail Co. 48
American Screw Co. 27
American Society for Metals 42
American Steel & Wire Division, United States Steel Corporation 47
American Welding & Manufacturing Co., The 58
Associated Spring Corporation 49
Atlantic Refining Co., The 46
Atlas Car & Mfg. Co., The 10
Avondale Marine Ways, Inc. 127

Babcock & Wilcox Co., The, Refractories Division 89
Bailey, William M., Co. 125
Baker-Raulang Co., The 3
Baldwin-Lima-Hamilton Corporation, Hamilton Division 30
Barnes-Gibson-Raymond, Division of Associated Spring Corporation 49
Barnes, Wallace, Co., Division of Associated Spring Corporation 49
Barnes, Wallace, Co., Ltd., The, Division of Associated Spring Corporation 49
Barnes, W. F. & John, Co. 102, 103
Beatty Machine & Mfg. Co. 101
Bethlehem Steel Co. 1
B-G-R Cook Plant, Division of Associated Spring Corporation 49
Birdsboro Steel Foundry & Machine Co. 156
Blaw-Knox Co., Foundry & Mill Machinery Division 145
Bliss, E. W., Co. 8, 9
Bridgeport Brass Co. 173
Browning, Victor R., & Co., Inc. 168
Buckeye Tools Corporation 25

Carpenter Steel Co., The, Alloy Tube Division 54
Chicago Rawhide Manufacturing Co. 73
Chrysler Corporation, Industrial Engine Division 178
Cincinnati Milling Machine Co., The 74
Cincinnati Milling Machine Co., The, Cincinnati Milling Products Division 24
Cincinnati Shaper Co., The 20, 21
Cities Service Oil Co. 139
Cleveland Hotel 16
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. 167
Climax Molybdenum Co. 123
Columbia-Geneva Steel Division, United States Steel Corporation 47
Copper & Brass Research Association 97
Cowles Tool Co. 169

Danly Machine Specialties, Inc. 137
Denison Engineering Division, American Brake Shoe Co. 43
Detroit Broach & Machine Co. 82
Detroit Steel Corporation 62, 84
Dodge Manufacturing Corporation 154, 155
Drave Corporation 64
Dresser Industries, Inc., Dresser Manufacturing Division 168
Dunbar Brothers Co., Division of Associated Spring Corporation 49

Eastern Machine Screw Corporation, The 168
Edgewater Steel Co. 57
Elastic Stop Nut Corporation of America 99
Electro-manganese Division, Foote Mineral Co. 6

Fafnir Bearing Co., The 114
Federal-Mogul-Bower Bearings, Inc., Federal-Mogul Division 7
Federal Products Corporation 134
Foote Mineral Co., Electro-manganese Division 6

Gardner Machine Co. 13
Gibson, William D., Co., The, Division of Associated Spring Corporation 49
Great Lakes Steel Corporation 78
Greenlee Bros. & Co. 19
Gulf Oil Corporation 92
Gulf Refining Co. 92

Hamilton Division, Baldwin-Lima-Hamilton Corporation 30
Heppenstall Co. 86
Herr Equipment Corporation, The 98
Hydraulic Press Mfg. Co., The, A Division of Koehring Co. 94, 95

Industrial Plants Corporation 168

Jones & Lamson Machine Co., Machine Tool Division 51
Jones & Laughlin Steel Corporation 91, 146

Keystone Lamp Mfg. Corporation 175
Koehring Co., The Hydraulic Press Mfg. Co. Division 94, 95

Lamson & Sessions Co., The 39
Lenco, Inc. 85
Lindberg Engineering Co. 22
Lord Baltimore Hotel, The 169
Lucas Machine Division, New Britain Machine Co., The 14, 15
Luria Brothers & Co., Inc. 171

Manross, F. N., & Sons Co., Division of Associated Spring Corporation 49
Micro Switch, A Division of Minneapolis-Honeywell Regulator Co. 142
Milwaukee Division of Associated Spring Corporation 49
Minneapolis-Honeywell Regulator Co., Micro Switch Division 142
Minnesota Mining & Manufacturing Co. 11, 35, 36, 37, 38
Molybdenum Corporation of America 50
Monarch Machine Tool Co., The 151
Motch & Merryweather Machinery Co., The, Machinery Manufacturing Division 26

National Acme Co., The, Electrical Mfg. Division 32, 33
National Automatic Tool Co., Inc. 44, 45
National Steel Corporation 78
National Tube Division, United States Steel Corporation 47
New Britain Machine Co., The 14, 15
Nilson, A. H., Machine Co. 104
North Carolina Department of Conservation & Development 12

Ohio Crankshaft Co., The 2
Ohio Division of Associated Spring Corporation 49

Phosphor Bronze Corporation, The, Subsidiary of The Seymour Manufacturing Co. 5
Pittsburgh Steel Co. 52, 53
Pope Machinery Corporation 153

Raymond Manufacturing Co., Division of Associated Spring Corporation 49
Reliance Steel Division, Detroit Steel Corporation 84
Remington Rand Division of Sperry Rand Corporation 113
Republic Steel Corporation 40, 41
Rucqui, Leon G. 175
Ryerson, Joseph T., & Son, Inc. 61

Scioky Bros., Inc. 129, 130
Seaboard Coil Spring Division of Associated Spring Corporation 49
Seymour Manufacturing Co., The 5
Sperry Rand Corporation, Remington Rand Division 113
Sun Oil Co., Industrial Products Department 17, 18

Tennessee Coal & Iron Division, United States Steel Corporation 47
Thomas Flexible Coupling Co. 152
Timken Roller Bearing Co., The, Steel & Tube Division ..... Back Cover
Transue & Williams Steel Forging Corporation 31

United States Steel Corporation, Subsidiaries 47
United States Steel Export Co. 47
United States Steel Supply Division, United States Steel Corporation 47

Veeder-Root, Inc. 4
Verson Allsteel Press Co. 81

Ward Steel Co. 16
Wheelabrator Corporation 141
Wheland Co., The 85

Youngstown Foundry & Machine Co., The 23

Table of Contents, Page 5

Classified Advertising, Page 175

HERE'S HELP for your tooling problems

Looking for a tool steel to do a specific job? Want to know where to buy a finishing carbide? This guide has the answers. It is a single source of information on more than a thousand different tooling materials. Knowing the job to be done, you can determine, with the guide, what product to buy and where to buy it. Cross indexes make it easy to locate tool steels and carbides by tradename, or to compile a list of sources for a single type.

40 PAGES

Copies of the Guide to Tool Steels & Carbides are available from Editorial Service, STEEL, Penton Bldg., Cleveland 13, O., at the following prices:

1 to 10	$2.00 ea.
11 to 50	1.90 ea.
51 to 100	1.80 ea.
101 to 200	1.70 ea.
over 200	1.60 ea.

to complete the picture — ... is yours a sharp enough pencil?

Sharpen your pencils! That's the advice highway officials will give contractors and subcontractors bidding under the new federal-state highway construction program. Both Uncle Sam and his taxpaying nephews and nieces want the most for their money.

Profit attainment, therefore, becomes more than ever a question of efficient operation. In these days of high-powered machinery, Power is the big difference between efficiency and inefficiency. This explains the growing trend to Chrysler Industrial Power, the importance of Chrysler "end product-engineered" engines.

What Is A Chrysler "End Product-Engineered" Engine?

It is a complete heavy-duty power combination — engine plus accessories – each component designed and engineered *by Chrysler to* fit the end product. A complete unit, it offers end product manufacturers and users all the advantages of one-stop sales and service.

Here are some typical examples of Chrysler End Product-Engineered Engines for the construction industry:

CONCRETE MIXERS—Engine plus
- Mechanical or Velocity Governor
- Special Crankcase Ventilation System
- Heavy-Duty Air Cleaner
- gyrol Fluid Coupling
- 3, 4 or 5-Speed Transmission
- Heavy-Duty Over Center Clutch and Power Takeoff
- LPG Carburetion System

FRONT-END LOADERS—Engine plus
- Chrysler Industrial Torque Converter
- Heavy-Duty Over Center Clutch and Power Takeoff
- 3, 4 or 5-Speed Transmission
- Engine-Driven Hydraulic Pump
- LPG Carburetion System

SHOVELS, CRANES AND HOISTS—Engine plus
- Heavy-Duty Over Center Clutch and Power Takeoff
- Chrysler Industrial Torque Converter
- Mechanical Governor
- LPG Carburetion System

ROAD ROLLERS—Engine plus
- Chrysler Industrial Torque Converter With or Without Tail Shaft Governor
- gyrol Fluid Coupling
- Heavy-Duty Over Center Clutch and Power Takeoff
- 3, 4 or 5-Speed Transmission
- LPG Carburetion System

Chrysler Industrial Engines and Power Units are end product-engineered for top-profit performance. Don't let power stall your efficiency . . . make sure your equipment is powered by Chrysler . . . 230 to 413 cubic inch displacement, in-line 6 and shortstroke V-8 engines. For full particulars see a Chrysler Industrial Engine Dealer, or write: **Dept. 59, Industrial Engine Division, Chrysler Corp., Trenton, Michigan.**

CHRYSLER INDUSTRIAL ENGINES

HORSEPOWER

WITH A PEDIGREE

DIVISION OF CHRYSLER CORPORATION • TRENTON, MICHIGAN

AETNA'S

new ideas

IN SEAMLESS, BUTT WELD,
GALVANIZING TINNING,
DRAWBENCHES, CLASSIFYING

are making news

AETNA • STANDARD

THE AETNA-STANDARD ENGINEERING COMPANY

GENERAL OFFICES: PITTSBURGH, PA. PLANTS: ELLWOOD CITY, PA., WARREN, OHIO

CONTINUOUS GALVANIZING LINES • CONTINUOUS ELECTROLYTIC TINNING LINES • SIDE TRIMMING AND SHEAR LINES AND OTHER FINISHING EQUIPMENT • CONTINUOUS BUTT WELD PIPE MILLS • SEAMLESS TUBE MILLS • DRAWBENCHES AND OTHER COLD DRAW EQUIPMENT • ROLLS AND CASTINGS • EXTRUDERS, MILLS, PRESSES FOR RUBBER AND PLASTIC

Twice around the clock or less—and your order for TIMKEN® 52100 steel is on its way to you

ALL it takes is a phone call today to get your rush order of Timken® 52100 steel tubing on its way tomorrow. We ship within 24 hours of your order because we stock 101 different sizes of 52100 tubing—from 1" to 10½" O.D., all available for less-than-mill quantity orders.

Timken 52100 steel can save you money as well as time. It can be used in place of many more expensive steels for hollow parts jobs that call for a steel that's hard and tough, yet easy to machine. 52100 is through-hardening in moderate sections and can be heat treated to file hardness and tempered back to any desired point.

Timken 52100 steel is ideal for parts such as: aircraft parts, ball bearing races, pump parts and plungers, collets, bushings, spindles, grinding machine parts, precision instrument parts.

The Timken Company is America's pioneer producer of 52100 steel tubing, and the only company that makes this steel in tubing, bars and wire. Our unequalled experience assures you of uniform steel quality from tube to tube, heat to heat, and order to order.

For immediate delivery of your less-than-mill quantity orders of 52100 steel, write, wire or phone The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING